Portal to Paunch: 
Dental/Medical Connections 
between the Mouth, Esophagus and Stomach

The Gastrointestinal Tract
- One long tube
- The upper GI tract
  - Mouth
  - Esophagus
  - Stomach
  - Small intestine
- The lower GI tract
  - Colon
  - Rectum

One Long Tube
- Oral/Systemic health
- Mouth as portal to the tube...
- Squamous cells vs. columnar cells
- 70 million+ experience GI difficulties

GI and Systemic Wellness

Immunity
- Protective mucosal lining
  - Food-based antigens, pathogens and toxins are managed
- Gut-Associated Lymphoid Tissue (GALT) → largest lymphoid organ in the body!
- Immune system challenged = inflammatory response
- Chronic = problems!

Sustenance
- Healthy microflora a necessity!
- Probiotics
  - Replaces good bacteria and helps maintain needed balance to pull nutrients from food
- Fiber
  - Soluble & insoluble
  - Allows slowing the breakdown of carbohydrates and entry into the bloodstream
  - Regulates “transit time”
  - Favorite food of good bacteria in the colon!

Emotional Well-being
- Enteric nervous system deeply connected to your emotions (Little Brain)
- Small intestine has more nerve endings than the spinal cord
- Manufactures up to 90% of serotonin
- Emotional stress affects the GI system
  - Fear – accelerates gut motility = diarrhea
  - Anger – stomach acids churn = queasiness, burning
  - Sadness/happiness – stimulates esophageal nerves = lump in the throat

GI Health
- Create a calm environment for eating
- Allow plenty of time in your day for elimination
- Choose fiber rich foods
- Drink plenty of water
- Stay away from foods that trigger allergy-like reactions or digestive after effects
- Take probiotics

Epithelium
- Located on the borders between internal and external surfaces
- Lines all internal body spaces that have some contact with external environment
- Tightly bound cells, no intercellular connective tissue
- Specialize cell membranes for different tasks, protective or metabolic

1st course objectives
- Squamous epithelium
  - Discover why the incidence of oral cancer in non-tobacco users is increasing
  - Discover interesting connections between oral health and anal cancer

2nd course objectives
- Squamous and columnar epithelium
  - Explore the acid reflux connection to esophageal cancer

3rd course objectives
- Squamous and Columnar epithelium
  - Investigate the oral cavity as a breeding reservoir for H. pylori

Oral Cancers
Historically
- Tobacco
  - Cigarettes, pipe, chew
- Alcohol acts synergistically with tobacco
  - Dehydration, increased permeability of cell wall
- Chew- better for lung cancer, problematic for pancreatic cancers and P. disease.
- Incidence: 45k new cases in 2015, one death per day from oral cancer
Today

- HPV leads as cause of all head and neck cancers
- White, non-smoking males age 35 and 55 are most at risk, 4 to 1 over females.
- Oropharyngeal specific areas up to 60% increase
  - Base of tongue
  - Incidence – Tongue > Floor of mouth > gingiva
- Tonsillar, Transition between mouth & throat
- These areas are similar to the T-zone in the uterine cervix

HPV

- Papilloma viruses infect squamous epithelial cells
- Benign hyperplasia (warts or papillomas)
- Squamous cell cancer
- HPV subgroup 16 = high risk HPV
  - 50% cervical cancers
  - 100% oral cancer
- Increased odds
  - ≥ 26 vaginal sex partners
  - ≥ oral sex partners
  - Sex partners with HPV anogenital cancers and invasive cervical cancers
- Mouth-to-mouth transmission possible
- HPV-associated oropharyngeal cancers have a BETTER prognosis than HPV-negative cancers
- 6.2 million new cases annually (all strains of HPV)

Estimated 74% new cases in 15-24 year olds

- Prophylactic vaccination with Gardasil
  - Protects against types 6, 11, 16, & 18
    - 6 & 11 – 90% genital warts
    - 16 & 18 – 70% cervical cancers, 100% OP cancers
  - Works best before contact with HPV types listed
  - 3 injections – initial, 2months & 6 months
  - Not a live virus
  - Current recommendation by CDC – vaccination schedule for 11-26 yo females
  - Male vaccination approved in 2011
    - May prevent genital warts and rare cancers, such as penile and anal cancer
    - Indirect health benefits for girls/women

Talking to Parents about HPV- http://www.cdc.gov/vaccines/who/teens/for-hcp-tipsheet-hpv.html

Anus

Anatomy

- 1.5 inches long opening between rectum and outside
- Functions as the gate to elimination
- Sphincters
  - Internal – involuntary control
  - External – voluntary control

Anal cancer

- 7,270 new cases in 2014 females have higher incidence

- Early symptoms
  - Feeling of foreign body in anus
  - Bleeding and pain with bowel movements

- Risk factors
  - In women, many anal cancers are preceded by other genital cancers (cervical most common)
Sexual extroversion rather than sexual preference a factor
Most cases of anal cancers are a consequence of the HPV type associated with cervical cancer
Smoking
Lowered Immunity
Gender and Race/Ethnicity

Anus to oral
HPV – found in genital tract, saliva, urine and semen
Sexual transmission through oral, vaginal and anal sex

Future of anal cancer
Anal self-exam?
Pap smear for the anus?

Esophagus
Physical properties and function
Epithelium – squamous cell
Lower esophageal sphincter is a band of muscle that keeps stomach contents within the stomach
Gastroesophageal reflux disease (GERD) – when acids leak back into the esophagus beyond normal limit causing symptoms
Typical – heartburn, regurgitation and dysphasia (difficulty swallowing)
Atypical – coughing, chest pain, damage to the lungs, vocal cords, ear and teeth

Causes
#1 – Functional problem of the LES (too much relaxation)
#2 – Certain foods, Medications, Hormones
Coffee, alcohol, citrus, acids
Medications – calcium channel blockers, nitrates, beta-blockers
Hormones – progesterone can decrease pressure on the LES
#3 – Obesity as a contributing factor due to increased intra-abdominal pressure, 6% more likely to develop esophageal cancer
Reflux is not only stomach acid but also bile and pancreatic secretions

Incidence
7% experience heartburn daily; of those 20-40% have GERD
Often under reported due to OTC medications
Esophagitis – 50% of GERD patients
Grade I – erythema
Grade II – linear confluent erosions
Grade III – circular confluent erosions
Grade IV – stricture or Barrett’s esophagus
Barrett’s Esophagus – a disorder in which the lining of the esophagus is damaged by stomach acid. Cells exhibit dysplasia.
Squamous cell epithelium is replaced by intestinal columnar epithelium
Risk factor for adenocarcinoma of the esophagus
8-15% of GERD patients develop Barrett’s
Esophageal cancer – adenocarcinoma (glandular) columnar cell are glandular
Nocturnal GERD – 75%
Time damages
- Sleeping pills or aids mask GERD
- Contribute to increased risk of further disease

- Oral Implications of GERD - Acid Wear

- Treatment of GERD
  - Control symptoms, heal esophageal epithelium and prevent recurrence

- Lifestyle
  - Avoid trigger foods & large meals
  - Wait 3 hours after eating to lie down
  - Elevate head of bed 8 inches
  - Weight loss

- Pharmacologic
  - Mild antacids after eating and at bedtime can directly neutralize acids
  - PPI – Proton Pump Inhibitor
    - Prilosec, Prevacid, Protonix
    - H+ equals proton
    - Shut off pumps that make the acid in the stomach

- Surgery
  - Laparoscopic Nissen Fundoplication
  - (wrap stomach around the esophagus creating a new sphincter)

Stomach

- Muscular organ for mixing
- Acid and pepsin for initial breakdown of food

Benign diseases
  - Acid reflux, GERD
  - H. pylori
  - Gastritis
  - Ulcers

Malignant diseases
  - Cancer
  - Lymphoma

H. pylori

- What it is?
  - Gram negative bacteria adapted to survive in the stomach

- How do we get it?
  - Human-to-human contact including mother-to-child
  - Oral-fecal transmission
  - Incidence – 10-60%. Approaching 100% in undeveloped countries

- What does it do to us?
  - Stomach ulcers & duodenal ulcers
  - Chronic, active inflammation of gastric mucosa

- Testing: Blood, Breath, Stool, Stomach

- Treatment
  - PPI
  - Antibiotics
    - New strains emerging that are antibiotic resistant
    - Auto re-infection
  - Prophylactic vaccination in the future?

H. pylori & the oral cavity

- Culprit in dental caries
  - In children – especially developing countries
  - Risk factor for dental caries
  - Eradication may lead to lowered caries rates

- Poor oral hygiene is a risk factor
- Contributes to halitosis as it resided in perio pockets
- Denture wearers are more susceptible
- Removing appliances at night and brushing 2x daily has proven results in eradicating H. pylori
- More difficult to remove from the mouth than stomach (lower levels of antibacterial drugs in saliva than in gastric juice)
- Can occur in the oral cavity independently of the stomach colonization
• Do oral hygiene practices increase efficacy of eradication from the stomach? Research is inconclusive.
• Vitamin E protects the mucosal epithelium from \textit{H. pylori}

101 patients studied with upper endoscopy and exam of perio pockets
\textit{H. pylori} cultured from dental plaque and stomach

<table>
<thead>
<tr>
<th>\textit{H. pylori}</th>
<th>Perio Patients</th>
<th>Non-Perio Patients</th>
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<tbody>
<tr>
<td>Dental plaque</td>
<td>79 %</td>
<td>43 %</td>
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<tr>
<td>Stomach</td>
<td>60 %</td>
<td>33 %</td>
</tr>
<tr>
<td>Dental Plaque &amp; Stomach</td>
<td>78 %</td>
<td>30 %</td>
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</tbody>
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The oral cavity appears to be a reservoir and a possible source for reinfection. \textit{Canadian J Gastroenterology 2009, Al Asqah}

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