Summary of Module 1

The purpose of this document is to help you find information in the future by providing you with a short summary of the content in each video

The Art of Chewing

The Art of Chewing – Slide 2
Number 1 cause of acid reflux

The Chewing Process – Slide 3
Chewing sets the rhythm for the rest of the digestion process
Saliva contains leptin, grehlin, beneficial bacteria and antibodies and antimicrobials

Chewing – Slide 4
Chewing 40 times helps with weight loss
Chewing 20-30 time at least

Benefits of Chewing – Slide 5

Video Digestive Process Part I

Digestive Processes – Slide 2 – 3
Chart on Slide 3

The Chewing Process – Slide 4 – 5
Benefits of Chewing – Slide 6
Structure of the GIT – Slide 7 – 9

Definitions of innervations, mechanorecptors, chemoreceptors– Slide 10

GI Tract Regulatory Mechanisms – Slide 11 – 12
Short and long reflexes definitions – Slide 12

Gastric Gland Secretions – Slide 14 – 17
Stomach secretions: HCl, intrinsic factor, pepsinogen, lactobacillus, acid lipases, somastatin, gastrin, histamine, serotonin

Mucosal barrier – Slide 18
Bicarbonate and mucous-rich lining with tight junctions to prevent juice form seeping thought the lining

Homeostatic Acid Imbalance – Slide 19
Gastritis, peptic and gastric ulcers – may be cause by h. pylori or NSAIDs, aspirin, ibuprophen, stress

Regulation of Gastric Secretin – Slide 21 – 22
Vagus nerve stimulation increase secretion and sympathetic stimulation decreases it. Hormone gastrin increase (stomach) enzyme production and HCl

Stimuli of Gastric Phases – Slide 23
Cephalic (reflex) phase, gastric phase -stimulation of gastrin for HCl and enzymes, then buffering action. Acetylcholine and histamine also involved

Enterogastric Reflex – Slide 24
Three reflexes inhibit vagus nerve, inhibit local reflexes, increase sympathetic activity and decreases gastric activity

Intestinal Phase – Slide 25
Hormones inhibit gastric secretion: Secretin, cholecystokinin (CCK), vasoactive intestinal peptide (VIP)

Response of the Stomach to Filling – Slide 26
Stomach stretches to fill it

Gastric Contractile Activity – Slide 27 – 28
Peristalsis moves food towards the pylorus – chyme enters and hormones and receptors respond.

Regulation of Gastric Emptying – Slide 29
Carbohydrate-rich chyme move quickly through the duodenum. Fatty chime does not

Regulation of Bile Secretion – Slide 31 – 32
Bile secretion stimulate by circulating bile salts and secretin – Gallbladder contractions stimulate by the vagus nerve cholecystokinin which both stimulates pancreatic juices

Regulation of Pancreatic Secretion – Slide 33
Secretin stimulates the production of bicarbonate to neutralize chyme

The Digestion Process Part II:

Digestion of the small intestines – Slide 2
Chyme from the stomach contains partially digested carbohydrates, proteins and undigested fats
Foods spend 2-3 hours in the small intestines where water and nutrients will be absorbed - requires slow delivery and bile acids, enzymes, bicarbonate ions

Requirements for Digestion and Absorption in the Small Intestine – Slide 3

Motility of the Small Intestine – Slide 4 – 7
Peristalsis initiated by release of the hormone motlin – neurons activate the myenteric plexus and cause contraction of circular and longitudinal muscles
Ileosecal sphincter and gastroileal reflex controls movement in the small intestine to the large intestine

Digestion – Slide 8
Digestion is catabolic and breaks down everything to its smallest constituent parts with the help of enzymes and water to break bonds

Brush boarder enzymes – Slide 9
Brush border are specialty enzymes located in the microvilli aid digestion of carbohydrates, proteins, fats and nucleic acids

Digestion of Carbohydrates – Slide 10 – 12
Digestion of Proteins – Slide 13 – 14
Digestion of Lipids – Slide 15 – 16
Digestion of Nucleic Acids – Slide 17 – 18

Absorption – Slide 19
All food, 80% of electrolytes, vitamins, minerals and most of the water are absorbed. Most substances use active transport or diffusion to be absorbed in the bloodstream but fats are absorbed via lymphatic capillaries

Absorption of Carbohydrates – Slide 20
Absorption of Protein – Slide 21

Homeostatic Imbalance – Slide 22
Homeostatic Imbalance refers to whole protein entering into bloodstream (through leaky gut)
Endocytosis: Energy-using process by which cells absorb molecules (such as proteins) by engulfing them Exocytosis: materials are exported out of the cell via secretory vesicles

Absorption of Lipids – Slide 23
Absorption of Nucleic Acids – Slide 24

Absorption of Vitamins – Slide 25
Absorption of Electrolytes – Slide 26 – 27
Absorption of Water – Slide 28
Summary of Digestion and Absorption - Slide 29
Chart

Malabsorption of Nutrients – Slide 30 – 31
Due to insufficient pancreatic enzymes, bile, good bacteria and damaged intestinal wall lining

Celiac disease – autoimmune reaction to gluten causing damage to microvilli and brush border enzymes (see Module 2 Autoimmunity video).

GI Motility: Large Intestine Motility – Slide 32 – 36
Diagram of Large intestine – Slide 32
Fecal matter – haustra (segment-like sacs) moves through the colon and out the rectum
Moves from semi-solid to solid by the time it reaches the rectum – and the urge to defecate occurs (only 25% of the rectum has to be full for this to occur and it can happen 1-3 times a day
The gastrocolic reflex in the stomach initiates the motility of the colon

Introducing Your Gut Bacteria

Microflora – Slide 2 – 4
1.5 kg bacteria in our gut – 1000 billion microbes, 1000 species and 5000 strains
Diagram of digestive system – Slide 3
Bacteria found in the mouth, genitals, urinary system, small intestines and large intestines
80% of our immune systems is in our gut.

Gut Microflora – Slide 5
50% of poo is bacteria producing 2 litres of gas per day

What is normal Microflora – Slide 7

Types of Organisms in the Gut – Slide 8
Prokaryotes: bacteria and archaea, bacteriophages (viruses that infect prokaryotes), eukaryotic viruses, meiofauna (primarily fungi and protozoa)

Immune tolerance – Slide 9
Prevents food allergies and autoimmunity and if an intolerance to good bacteria occurs - inflammation and Crohn's.

The Normal Human Microflora-Adult – Slide 10
Fully developed to adult level by the age of two this is our residential bacteria

Residential Flora – Slide 11
Acquires rapidly during and after birth, changes continuously, and reflects: age, nutrition, genetics, environment and sex of a person

Adult Microflora – Slide 12 – 13
Changes based on diet, stress and antibioticsA Theory of aging: The increase of bad bacteria producing toxic substances in the large bowel is a factor of aging

Proteolytic bacteria - eg clostridia are part of the normal gut flora, produces toxic substances phenols, indols and ammonia from the digestion of proteins.

Key changes in the elderly when antibiotics are prescribed – Lowers: Bacteroides and bifidobacteria, Amylolytic activity, and total SCFA (Acetate, propionate, and butyrate). Increases: Faculative anaerobes, Fusobacteria, clostridia, eubacteria, and proteolytic activity

Formula for Disease – Slide 14
Increased numbers of facultative anaerobes in conjunction with a decrease in beneficial organisms, along with a general reduction of species diversity and changes to the diet and digestive physiology, may result in increased putrefaction in the colon and a greater susceptibility to disease.

Small Intestines – Slide 15
Length: 20ft
Necessary for bacteria to attach to in order for good bacteria to colonize
Bacterial layer is one cell thick

Large intestines – Slide 16
Length: 6ft
Attachment not necessary for colonization
Bacterial layer up to 200 cells thick

Nutrients For Energy – Slide 18
GI tract mucosa is the only body tissue with a systemic and luminal nutritional source.

Gut Flora Is Essential For – Slide 19
The development of Th1 and Th2 in the body and the mucosa, numbers and activities of the macrophage, antibody development, developing immune tolerance mechanisms, and decreasing susceptibility to infections.

Good Bacteria and the Immune system – Slide 20
Drives the development of the our antibody system, Enables the immune systems to give the correct response to food and environmental substances and it makes sure the immune system to reacts quickly and appropriately to potential pathogens.

Brain gut connection – Slide 21
Healthy gut sends the right signals to the brain and healthy brain sends the right signals to the gut
Stress can adversely affect the gut

Gut Brain – Slide 22 – 23
Gut bacteria sends message to the brain and the brain sends messages to the gut, this communication is done through the vagus nerve. 80% of the vagus nerve fibers send information from the gut to the brain. Vagus nerve stimulation helps control disruption of the gap junctions.

Good Bacteria – Slide 24
Anerobic and is know primarily as lactic acid bacteria (LAB), the two main species are the lactobacilli and the bifido bacterium.
Good bacteria can have a synergistic relationship with yeast and fungus to produce helpful enzymes and good bacteria are considers gram-positive and bad bacteria is considered gram-negative.

In Conclusion – Slide 25

What Does Diversity Mean?

Diversity – Slide 2
Why the talk now – Slide 3
The gut is much more diverse than researchers thought

Diversity – Slide 4
Overall quantity of bacteria on our body (good and bad), refers to different types of strains. The greater the number of different types the better

Bacteria Taxonomy – Slide 5
The classification system - Kingdom, Phylum, Class, Order, Family, Genus, Species.

Diversity – Slide 6 – 7
Rural Africans - greater diversity because they are exposed to more dirt lower incidences of common intestinal disorders, heart disease, cancer, diabetes, obesity and allergies
Have more parasites and other negative microbes than westerners
Residential bacteria amount develops by the age two
Stress, diet, lifestyle, drugs especially antibiotics play a role in how we maintain our microbiome

What is a MAC diet – Slide 8
MAC diet – Microbiota – accessible carbohydrates found in resistant starch foods. Considered ideal for maintaining diversity of strains and quantity

New research – Slide 9

Building Diversity – Slide 10 – 11
Eat Prebiotics, expose yourself to the outside, don't be afraid to touch people
Have pets or pet other peoples pets, eat fermented foods.

Helping clients – Slide 12
Importance of gut in relation to their health concerns, eating high MAC foods, one prebiotic fibre rich food at a time.

Getting Your Poop Tested

Using the company uBiome to test your poop to look at your microbiome
Taxonomy of Lactobacilli and Bifidobacteria – Research paper

Gut bacteria and Paediatrics

What we Know – Slide 2
In a Perfect World – Slide 3

What we need to Know – Slide 4
The majority of good bacteria that the baby needs is received from the environment both as and after the baby is born into the world.

When a baby is born – Slide 5 – 6
Vaginal birth
Strains - Mainly Lactobacilli (mainly acidophilus types), streptococci non-haemolytic, Enterobacteria: various types including E coli.
Minor Colonisors : Bifidobacteria, bacteroides, clostridia
C-Section
Strains: Staphylococci (aureus) (MRSA) Enterococci, enterobacteria.
Minor Colonisors : Lactobascilli, Bifidobacteria, bacteroides, clostridia

Breast Milk – Slide 7 – 8
A small number of good bacteria is collected by dendritic cells and macrophages from small intestines, it is transferred to the breast tissue, via the lymph system. The numbers are low – 10,000 – 1 million CFU per 100 ml breast milk Proves baby get mothers intestinal flora through breast milk.

Building Gut Bacteria – Slice 9
At 1 Week - Bacteria in breast fed is 95% bifidobacteria and 3% enterobacteria. Bacteria in bottle fed only has 22% bifidobacteria and 69% enterobacteria
At 19 weeks, the breast fed baby is still at 95%. Bottle fed is 77% bifidobacteria with enterobacteira at 2% and 8 % respectively.

Slide 10
Chart to illustrate the differences between breast fed and bottle fed.

Prebiotics – Slide 11
Breast milk contains prebiotics mainly galactose oligosaccharides (GOS) which causes the increase production of bifidobacteria at 1 week.

Slide 12
Chart shows results of a study that shows bifidobacteria levels in infants gut

Allergies in Children – Slide 13
Good bacteria can induce the production of IL-10 and transforming growth factor-beta, which possess an important regulative role in the development of allergic-type immune response
Probiotics also strengthen gut defense barrier mechanisms and reduce antigen load in the gut.

Study #1 – Slide 14
Study #2 – Slide 15
Study #3 – Slide 16
Allergies Studies – Slide 17

Issues for Optimal Gut Health for Babies – Slide 18
Is baby breast fed or formula fed?
Is baby delivered vaginally or by cesarean?
What are the condition of mother pre-conception, during pregnancy and while breast feeding?
Has the baby received an early course of antibiotic – before the age of 2?
What is the quality of mothers diet during her life, pregnancy and while breast feeding?

Slide 19 – 24
Study: IMPACT of INTRAPARTUM ANTIBIOTIC PROPHYLAXIS & OTHER PERINATAL INTERVENTIONS on the INFANT GUT MICROBIOME: findings from the CHILD Canadian birth cohort.
Summary of Findings

Comparison of findings to the human literature – Slide 25

Diets – Slide 26
Diets high is refined sugar, fat and protein are associated with dysbiosis.

Building Mother's Residential Bacteria – Slide 27
Mother should be on probiotics for entire duration of pregnancy and breast feeding. The probiotic should contain GOS and if not then GOS should be added to the dietary protocol (dairy, legumes).
Mother should also consume fermented foods and glutamine-rich foods.
Once baby is born, the mother needs to continue this protocol – if breast feeding.

Probiotic During Pregnancy – Slide 28
Study – Slide 29

Other Gut Health Nutrients – Slide 30 – 31
NOTE: As nutrition professionals, we should work with MDs or midwives before recommending supplements other than probiotics.

For Baby – Slide 32
Probiotics and Prebiotics are provided through breast milk. If formula fed, then the formula

needs to contain GOS and FOS. Babies can start probiotics with prebiotics at 6 months old. Formulas with GOS: Similac Go and Grow Omgea 3 and 6.

Fermented Foods for Babies – Slide 33
Traditionally, fermented foods have been introduced to babies
Lactobacillus GG may reduce respiratory infections in daycare (according to one study) and another found similar results with L. reuteri and B. lactis.
Fermented-milk formulas may help gut flora and immune tolerance.

Foods To Feed Children – Slide 34
Milk kefir made with Russian kefir grains (32 good bacteria and yeast strains).
To start baby – place some on the tip of finger and place on baby's tongue.
For feeding older children. Start with a small amount and work

Fermented Grains – Slide 35
Starting baby with a fermented or "soured" porridge is also traditional.

Cultured Vegetable Juice – Slide 36
The crunchiness of the cultured vegetable is too much for a baby. If the food can be purreed easily (like zucchini or tomato), then it may be acceptable. The juice of cultured vegetables is another option – especially sauerkraut juice, put it on babies tongue

Raising Healthy Children – Slide 37
This is an education process for parents, help clients find and/or make fun foods for their kids that contain prebiotics and probiotics and teach parents why this is important.

Children with Allergies – Slide 38
Feeding children with allergies prebiotics and probiotic foods and trusting the power of the body to repair itself can help until more definitive answers are available.

In General – Slide 39 – 40
Educating mothers about not being afraid of bacteria is important and help them create an environment for diversity.

As Practitioners – Slide 41