Study Guide for NTR 306 Midterm

- One continuous, 75-minute attempt – Yes, it is timed!
  - If you have SSD accommodations for extra time, it will be automatically added to your exam
- Approximately 40 questions
  - Multiple choice, matching, T/F, fill-in-the-blank
  - ~Half of questions are *application-based* (i.e., word problems)
  - Chapters 1-7
  - Open book: use class materials only (e.g., notes you have taken (or SSD notes), textbook/e-book, lecture slides, lecture videos, etc.) – NO internet searches! Please show academic integrity.
- 100 points

*****This study guide does NOT contain every theme that will be on the midterm, nor will every theme in this study guide be tested. This is a *guide* – you are in control of your own preparation!*****

Review concepts from Chapter 1-2

- Factors that influence food choices
- Six classes of nutrients:
  - Organic vs inorganic
  - Energy yielding vs non-energy yielding
    - kcalorie values of energy yielding nutrients
  - Macronutrients vs micronutrients
- Scientific Method
- Study Designs & Interpreting the Evidence

Review concepts from Chapter 1-2

- Dietary Reference Intakes (DRI)
  - EAR, RDA, AI, UL
- Estimated Energy Requirement (EER)
- Acceptable Macronutrient Distribution Ranges
  - Carbohydrate, fat, and protein
  - Calculate daily kcalories/grams within AMDRs
- Nutrition information sources
  - Registered Dietitians
  - Analyzing information from different sources (e.g. internet)

Review concepts from Chapter 1-2

- Diet-planning principles
  - Adequacy, balance, energy control, nutrient density, moderation, variety
- *Dietary Guidelines for Americans*
  - *Healthy Eating Index*
  - *Current Recommendations*
- USDA Food Patterns
  - Analyze meals for the six food groups and subgroups
  - Serving sizes and equivalent measures for six food groups and subgroups
- My Plate

Review concepts from Chapter 1-2

- Food processing
  - Whole, fortified, minimally processed, ultra-processed
  - Grains: refined, enriched, whole-grain
- American dietary habits
  - Overconsumption and underconsumption of certain nutrients
- Nutrition labels:
  - Differences between claims on nutrition labels:
    - Nutrient claims, health claims, structure-function claims
  - Interpreting nutrition facts labels:
    - Finding serving size, calculating total kcalories, calculating kcalories from each of the major nutrient groups (e.g. fat, carbohydrates, protein), interpreting ingredients list, new labels vs old labels

Review concepts from Chapter 3

- Digestive processes
  - Food's journey from ingestion to excretion (pathway through digestive organs and sphincters; transition from food to bolus to chyme to stool)
  - Muscular actions
  - Secretions: enzymes, juices, bile, mucus
    - pH changes throughout digestive processes
- Absorptive processes
  - Anatomy and pathways of nutrient absorption
  - Vascular system (i.e. bloodstream) vs lymphatic system
- Specific digestive and absorptive processes for energy nutrients
  - Fats, proteins, carbohydrates

MOUTH: CHEWING AND SWALLOWING, WITH LITTLE DIGESTION

Carbohydrate digestion begins as salivary amylase breaks down starch from bread and peanut butter.
Fiber covering on the sesame seeds is crushed by the teeth.
Fat digestion is minimal. Some hard fats melt as they reach body temperature.
Protein foods are moistened by saliva.

STOMACH: COLLECTING AND CHURNING, WITH SOME DIGESTION

Carbohydrate digestion ceases when the stomach acid of the gastric juices inactivates the salivary amylase.
Proteins from the bread, seeds, and peanut butter begin to uncoil when they mix with the gastric acid, exposing them to the gastric protease enzymes that break down proteins.
Fat from the peanut butter and seeds tends to separate from the watery GI juices.

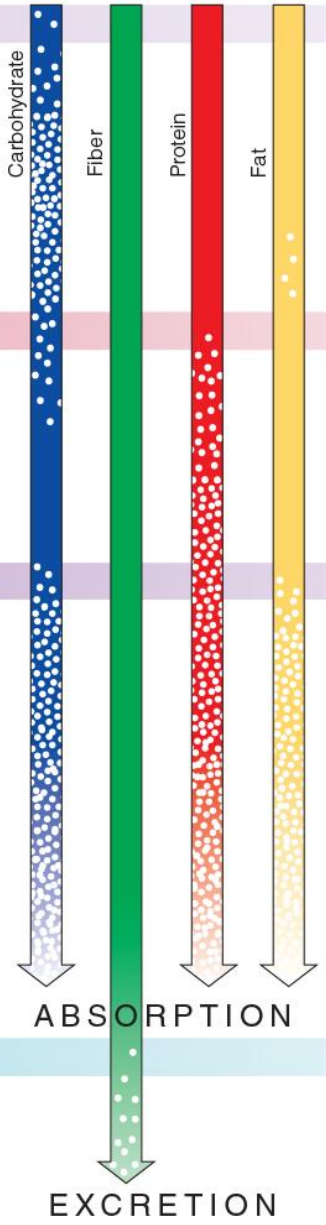
SMALL INTESTINE: DIGESTING AND ABSORBING

Carbohydrate digestion picks up when the pancreas sends pancreatic enzymes to the small intestine via the pancreatic duct to break down starch. Enzymes on the surfaces of the small intestinal cells complete the process of breaking down starch into small fragments that can be absorbed through the cells of the small intestine walls and into the hepatic portal vein. Sugars from the banana require so little digestion that they begin to traverse the intestinal cells immediately on contact.
Fat from the peanut butter and seeds is emulsified by bile. Now pancreatic and intestinal lipases can break down the fat to smaller fragments that can be absorbed through the cells of the small intestine wall and into the lymph.
Protein breakdown depends on the pancreatic and intestinal proteases. Small fragments of protein are absorbed through the cells of the small intestine wall and into the hepatic portal vein.
Vitamins and minerals are absorbed.

Note: Sugars and starches are members of the carbohydrate family.

LARGE INTESTINE: ABSORBING AND ELIMINATING

Fluids and some minerals are absorbed.
Some fibers from the seeds, whole-wheat bread, peanut butter, and banana are partly digested by the bacteria living in the large intestine, and some of these products are absorbed.
Most fibers pass through the large intestine and are excreted as feces; some fat, cholesterol, and minerals bind to fiber and are also excreted.



Review concepts from Chapter 3

- Digestive reactions: condensation vs hydrolysis
- GI microbiota functions
- GI hormone action and negative feedback loops
  - Gastrin, secretin, CCK
- Common digestive problems

Review concepts from Chapter 4

- Soluble fiber:
  - Dissolving in water, gel formation (viscous), fermentation, and the ability to lower blood cholesterol
  - Examples: barley, oats, legumes
- Insoluble fiber:
  - Indigestible components of the diet that promote bowel movements, alleviate constipation and prevent diverticular disease
  - Examples: wheat bran, legumes, brown rice

Review concepts from Chapter 4

- Carbohydrate characteristics and digestion:
  - Monosaccharides: glucose, fructose, galactose
  - Disaccharides: maltose, sucrose, lactose
  - Polysaccharides: glycogen, starch (amylose, amylopectin), fiber (soluble, insoluble)
- Carbohydrate digestion:
  - Mouth (salivary amylase)
  - Stomach (none)
  - Small Intestine, primary site (pancreatic amylase; maltase; sucrase; lactase)
  - Large Intestine (none); Fermentation
- Carbohydrate absorption:
  - Active transporters (glucose and galactose); Passive (Fructose)

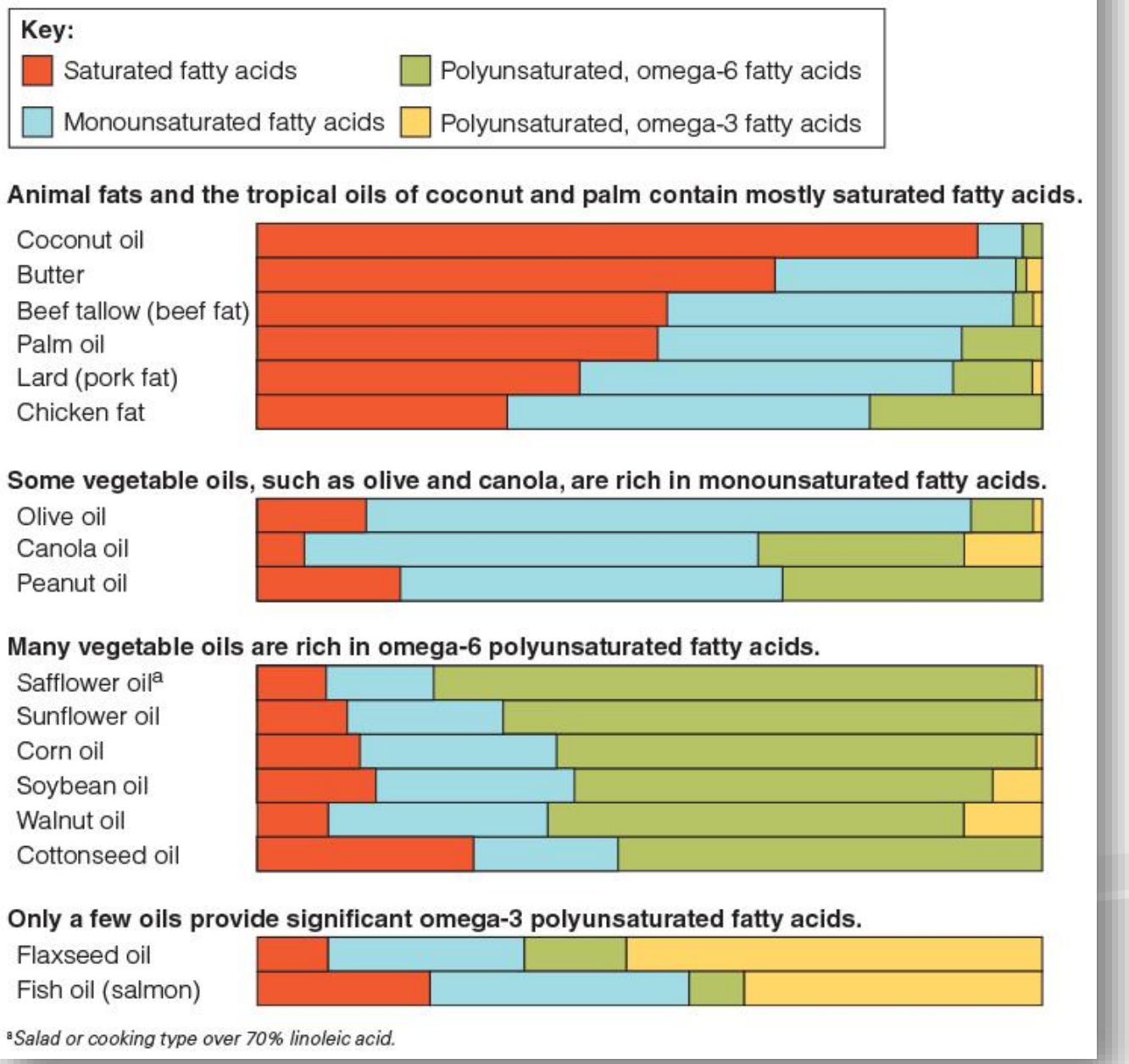
Review concepts from Chapter 4

- Carbohydrate metabolism
  - Glucose storage (glycogen), use for immediate energy or stored as fat
  - Organ uses (Brain first, others second)
  - Glucose and hormone interactions:
    - Blood glucose rises (during/after meals): triggers release of insulin (moves glucose to cells to store excess) → blood glucose level is lowered
    - Blood glucose falls (between meals, overnight): triggers release of glucagon (moves glucose out of storage to fuel body) → blood glucose level is raised
    - Irregularities: Diabetes & Hypoglycemia
- Health impacts of carbohydrates and recommended intakes
  - Simple Sugars
  - Low/No calorie Sweeteners
  - Starches & Fibers

Review concepts from Chapter 5

> FIGURE 5-5

Most fats are a mixture of saturated, monounsaturated, and polyunsaturated fatty acids.



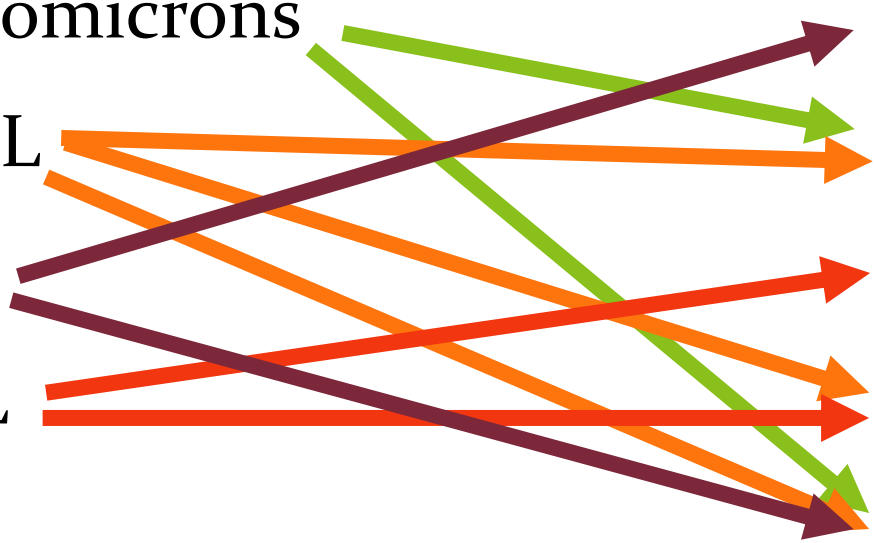
[a] *Salad or cooking type over 70% linoleic acid.*

Review concepts from Chapter 5

- Degrees of unsaturation of fats: saturated vs monounsaturated vs polyunsaturated
  - Characteristics and molecular structures of each
  - Hydrogenation
  - Trans-fats
- Others: Phospholipid & Sterol characteristics
- Digestive pathways and absorption processes of lipids
  - Mouth (lipase); Stomach (lipase); Small Intestine, primary (Bile, Lipases)
  - lymphatic system to circulation (fat globules → micelles → chylomicrons → VLDL, etc.)
- Fat Metabolism
  - Circulating TG → FAs (muscle & adipose tissue use lipoprotein lipase)
  - Adipose TG → FAs (hormone sensitive lipase)
- Lipoprotein types, characteristics, and health implications
  - Dietary cholesterol vs blood cholesterol; TG vs Cholesterol

Review concepts from Chapter 5

Lipoprotein	Characteristic
1. Chylomicrons	A. Associated with heart disease
2. VLDL	B. “Ferry Boat” for triglycerides
3. LDL	C. Cholesterol excretion
4. HDL	D. Synthesized in the liver
	E. Deliver lipids to body cells



Review concepts from Chapter 5

- Fatty acids:
  - Linoleic vs linolenic
  - Omega-3 fatty acids vs omega-6 fatty acids
  - Essential, non-essential, conditionally essential
- Relationships between different fats and health outcomes
  - Chronic disease
- Metabolic changes due to dietary insufficiencies:
  - Low-carb diet
    - Gluconeogenesis

Review concepts from Chapter 6

- Roles of protein in the body
- Amino acids
  - Essential, nonessential
- Protein digestion
  - Mouth (nothing)
  - Stomach (HCL, pepsin)
  - Small Intestine (proteases, peptidases)
- Protein absorption active transporters (AAs)
- Protein metabolism
  - Nitrogen balance
  - Amino Acid Pool
  - Urea production and excretion

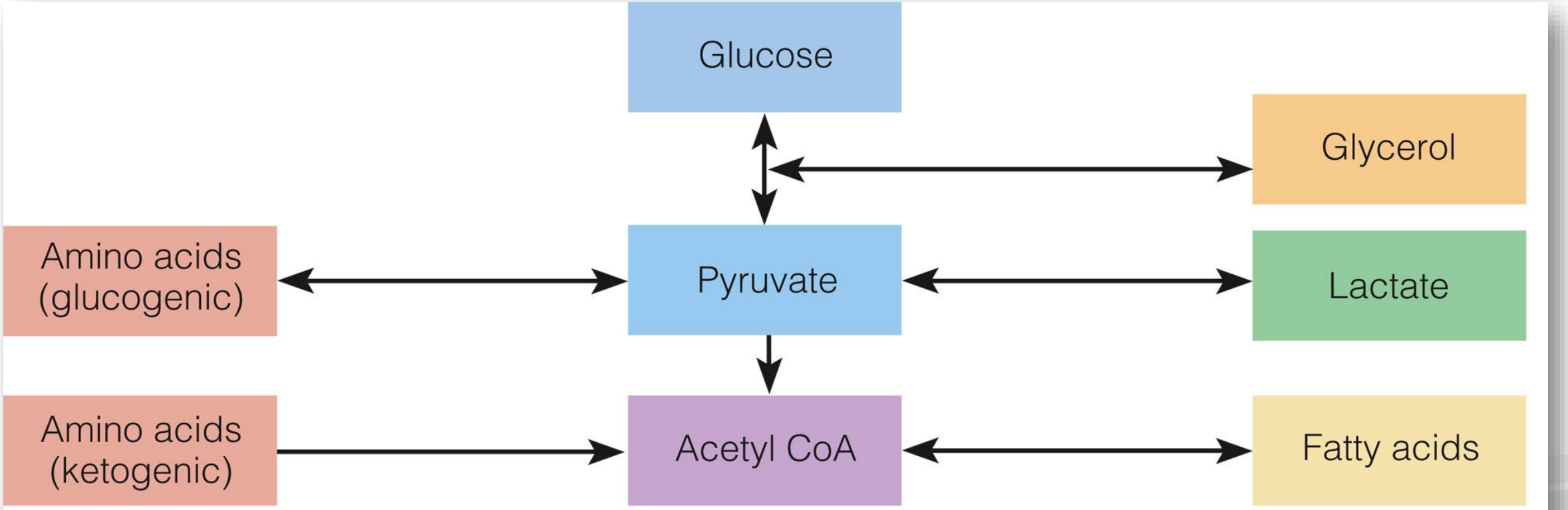
Review concepts from Chapter 6

- Protein deficiency
- Protein & Health
  - No effects on CVD, T2D, or Cancer
  - Benefits for weight management, glycemic control, appetite control, satiety, performance
- Protein quantities
  - RDA vs. Optimal Amounts

Review concepts from Chapter 7

- Reactions: catabolic vs anabolic
- Role of enzymes and coenzymes
- Metabolic compounds: Acetyl CoA and pyruvate
- Glycolysis (conversion of glucose to pyruvate)
- Pyruvate's options: lactate vs Acetyl CoA
  - Cori cycle
- Glycerol and fatty acid pathways
- Amino acid metabolic pathways

Review concepts from Chapter 7



NOTE: Amino acids that can be used to make glucose are called *glucogenic;* amino acids that are converted to acetyl CoA are called *ketogenic.*

Review concepts from Chapter 7

- TCA cycle
- Electron transport chain
- Metabolic processes of overconsumption of energy nutrients
  - Fat, carbohydrate, protein

Review concepts from Chapter 7