RBC Cardinal Health

DENVER

JULY 9-12, 2025

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Partners In Health:
Clinical Approaches To Managing Obesity in Pharmacy

Kathy M. Campbell, PharmD
Dr. Kathy Health, Owasso Wellness Pharmacy & Compounding
Wellness Pharmacy Network
Denver, Colorado Friday, July 9, 4-5pm

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Disclosure Statement

Kathy Campbell has/had a financial interest with DrKathy Health, Dispense Pharmacy Network, InBody USA, and Clinical Care Pharmacy of Owasso Inc and the relationship has been mitigated through peer review of this presentation. There are no relevant financial relationships with ACPE defined commercial interests for anyone else in control of the content of the activity.

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Pharmacist Learning Objectives

1. Identify three tools pharmacy teams can use to monitor and assess obesity-related health status.
2. Discuss pharmaceutical agents that may contribute to or exacerbate obesity as well as those that can be used for obesity management.
3. Describe pharmacist-led strategies for lifestyle optimization and patient engagement for obesity management.

Technician Learning Objectives

1. Identify three tools pharmacy teams can use to monitor and assess obesity-related health status.
2. List pharmaceutical agents that may contribute to or exacerbate obesity as well as those that can be used for obesity management.
3. Describe pharmacist-led strategies for lifestyle optimization and patient engagement for obesity management.

Obesity

The unhealthy accumulation of body fat. Defined as a BMI>30kg/m^2

Etiology-Obesity is the end result of an imbalance between food eaten and energy expended, but ***the underlying causes are more complex. Genetic, hormonal, and neurological influences all contribute to weight gain and loss.*** In addition, some medications (e.g., tricyclic antidepressants, insulin, and sulfonylurea agents) may cause patients to gain weight.

Taber's Cyclopedic Medical Dictionary 19th edition

Pharmacology

-a branch of medicine, biology, and pharmaceutical sciences concerned with drug or medication action, where a drug may be defined as ***any*** **artificial, natural, or endogenous molecule** which exerts a biochemical or physiological effect on the cell, tissue, organs, or organism.

The Pharmacist's Advantage

The pharmacist is trained in assessing and altering metabolic function with the selection, creation, dispensing, monitoring and adjusting of therapeutic interventions in order to achieve optimal health outcomes.

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Obesity is the ***appropriate*** biochemical and physiologic consequence of many cultural, hormonal, environmental, psychological, and nutritional influences.

Obesity is the Symptom

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Lifestyle-the habits, attitudes, tastes, moral standards, economic level, etc., that together constitute the mode of living of an individual or group. www.dictionary.com/browse/lifestyle

Lifestyle Interventions-Non-pharmacological interventions revolving around behavioral changes towards the adoption of new habits, usually aiming for a positive impact on quality of life.

Lifestyle modification strategies as first line of chronic disease management."

Oh S, Kim E, Shoda J. Front Physiol. 2023 May 10;14:1204581. doi: 10.3389/fphys.2023.1204581. PMID: 37234423; PMCID: PMC10206390.

"…as an adjunct to diet and exercise."

Package insert

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Lifestyle???

Really????

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Culture (verb) maintain (tissue cells, bacteria, etc.) in conditions suitable for growth.

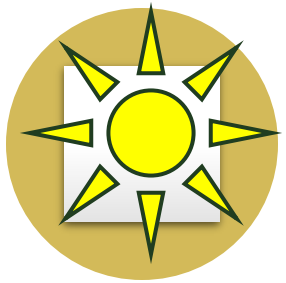
Oxford Dictionary/Bing

"We live in a culture that reliably produces disease, reliably produces obesity. We live in a culture that **blames the individual for being obese**, while at the same time making it almost impossible to be any other way."

Kathy M. Campbell, PharmD
TEDx Tulsa 2018

Foundational Health

METABOLIC CHEMISTRIES, FOOD, NUTRIENTS, SUPPLEMENTS, MEDICATIONS, TOXINS, GENETICS



SUNLIGHT, CIRCADIAN RHYTHMS, PHOTOBIOMODU-LATION, VITAMIN D, MELATONIN, SAUNA, BLUE LIGHT

WATER, OSMOLALITY, NA/K/MG/CA, FILTRATION, DEHYDRATION, PLASTICS

OXYGEN, MOVEMENT, IRON, CARDIOVASCULAR HEALTH, ENVIRONMENT, NITRIC OXIDE

CONNECTION, LOVE, SAFETY, PURPOSE, GROUP INTERACTION, EDUCATION, EMPATHY, EMPOWERMENT

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“We know it takes 15 years to become diabetic.”

Presenter APhA Diabetic Review 2012

Tabák, Adam G et al. Prediabetes: a high-risk state for diabetes development. The Lancet, Volume 379, Issue 9833, 2279 – 2290

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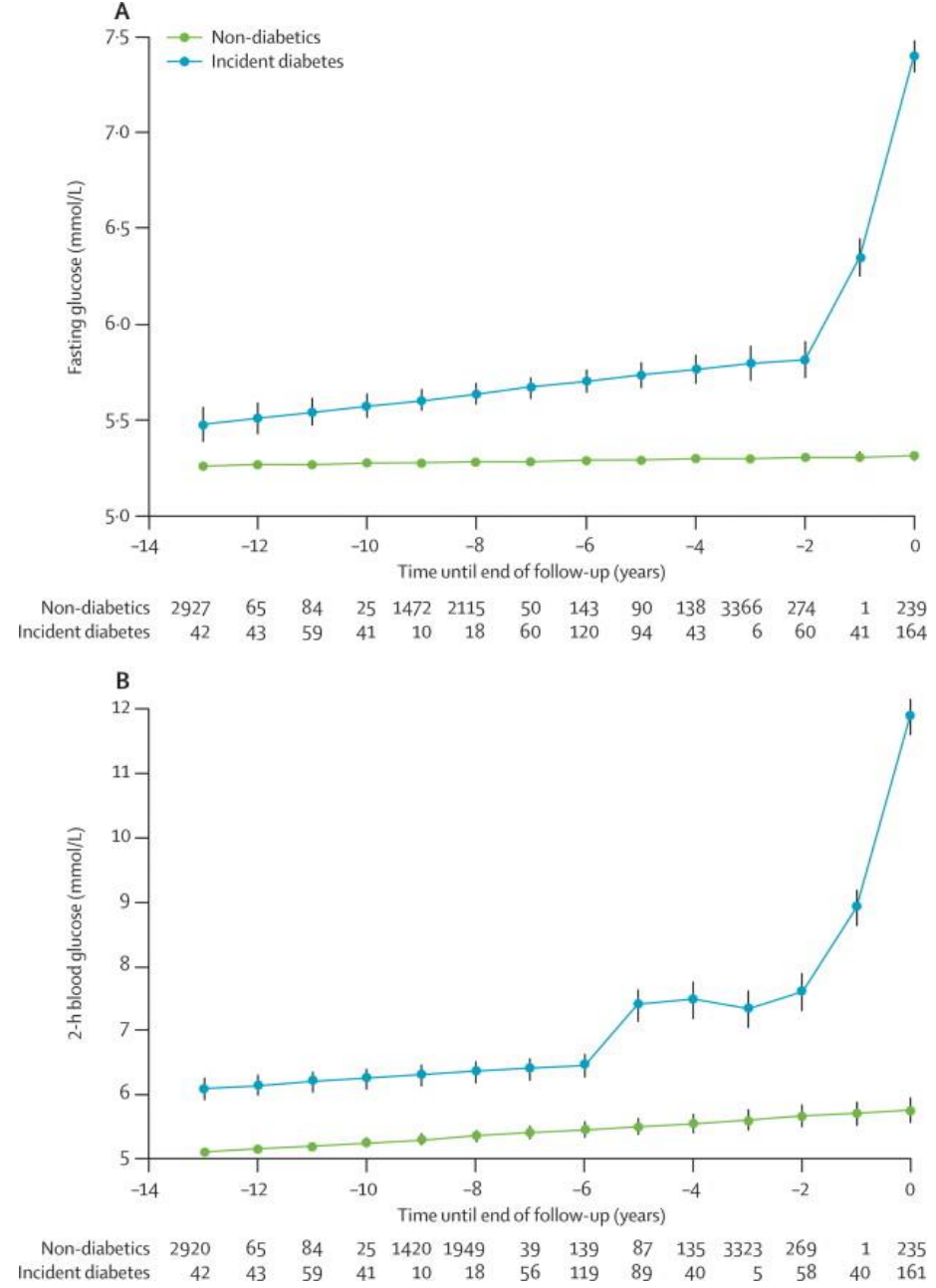


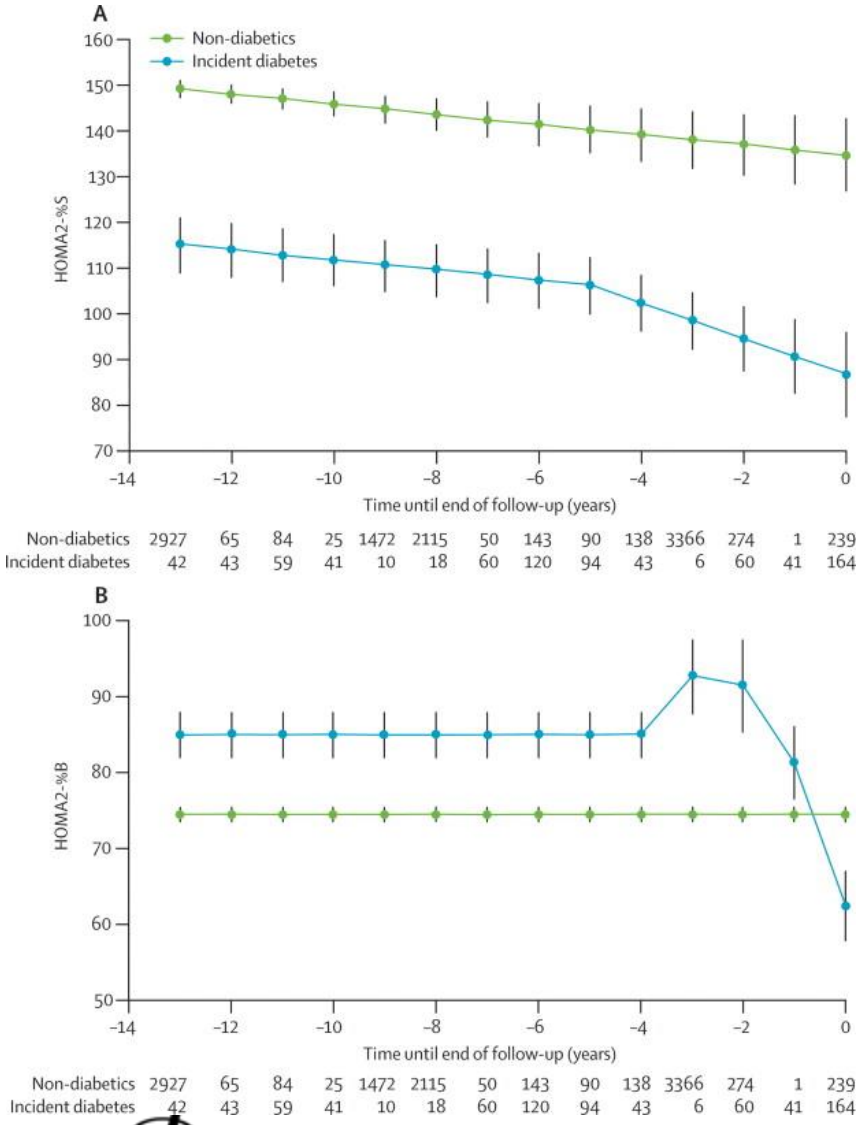
- A steady trend in fasting glucose as early as 13 years prior to the diagnosis of type 2 diabetes, with fasting glucose levels rising rapidly three years before diagnosis.

- Glucose levels after eating (post-meal glucose) began to increase rapidly starting three years prior to diagnosis.

Fasting (A) and 2-h postload (B) glucose trajectories before diagnosis of diabetes or the end of follow-up

LANCET, VOLUME 373, ISSUE 9682, P2215-2221, JUNE 27, 2009

Homoeostasis model assessment (HOMA) **insulin sensitivity (**A) and HOMA **β-cell function** trajectories (B) before diagnosis of diabetes or the end of follow-up



- Insulin sensitivity began to decline steeply five years before diagnosis.

- Beta-cell function -- a measure of insulin production -- began to increase three to four years prior to diagnosis, as the pancreas tried to compensate for increases in blood glucose by producing more insulin. Insulin production dropped precipitously in the three years prior to a diagnosis of type 2 diabetes.

LANCET, VOLUME 373, ISSUE 9682, P2215-2221, JUNE 27, 2009

“If Diabetes is a 13-15 year process, why are we waiting until year 16 to do anything about it??”

Peripheral Insulin Resistance

Postprandial Glucose excursions

Hyper**insulinemia**

Increased Hunger

Hypertension

Weight gain-Waist to Hip ratio changes

Hepatic **Insulin** Resistance

Elevation of Lipids

Non Alcoholic Fatty Liver Disease-**NAFLD**

Macrovascular Disease

Microvascular Disease

Beta-cell disfunction

Initial Elevation of A1C-Prediabetes

Diabetes diagnosis

ANABOLIC VS. CATABOLIC

INSULIN CORTISOL

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Pharmaceutical Approaches to Obesity

BRAIN-Appetite Suppressants

Stimulants

Phentermine, Phentermine-topiramate, Diethylpropion

Naltrexone-Bupropion

PANCREAS/GUT

Orlistat

GLP-1, GIP(Glucose-dependent insulinotropic polypeptide), Amylin agonist, etc, etc.!!!

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GLP-1-Glucogon Like Peptide-1

- Represents a fundamental paradigm shift in our understanding of the biochemical complexities of obesity.
- One of several gastrointestinal peptide hormones binding to G-proteins coupled receptors (GCPR) in response to **diet.**
- Multiple mechanisms for action-increase insulin, strong decrease of glucagon, modulates central nervous system hunger system.

Why do we need them?
Why are they working?
How do we optimize use?

…minimize need and negative effects?

Metabolism refers to the whole sum of reactions that occur throughout the body within each cell and that provide the body with energy.

Sánchez López de Nava A, Raja A. Physiology, Metabolism. [Updated 2022 Sep 12]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK546690/

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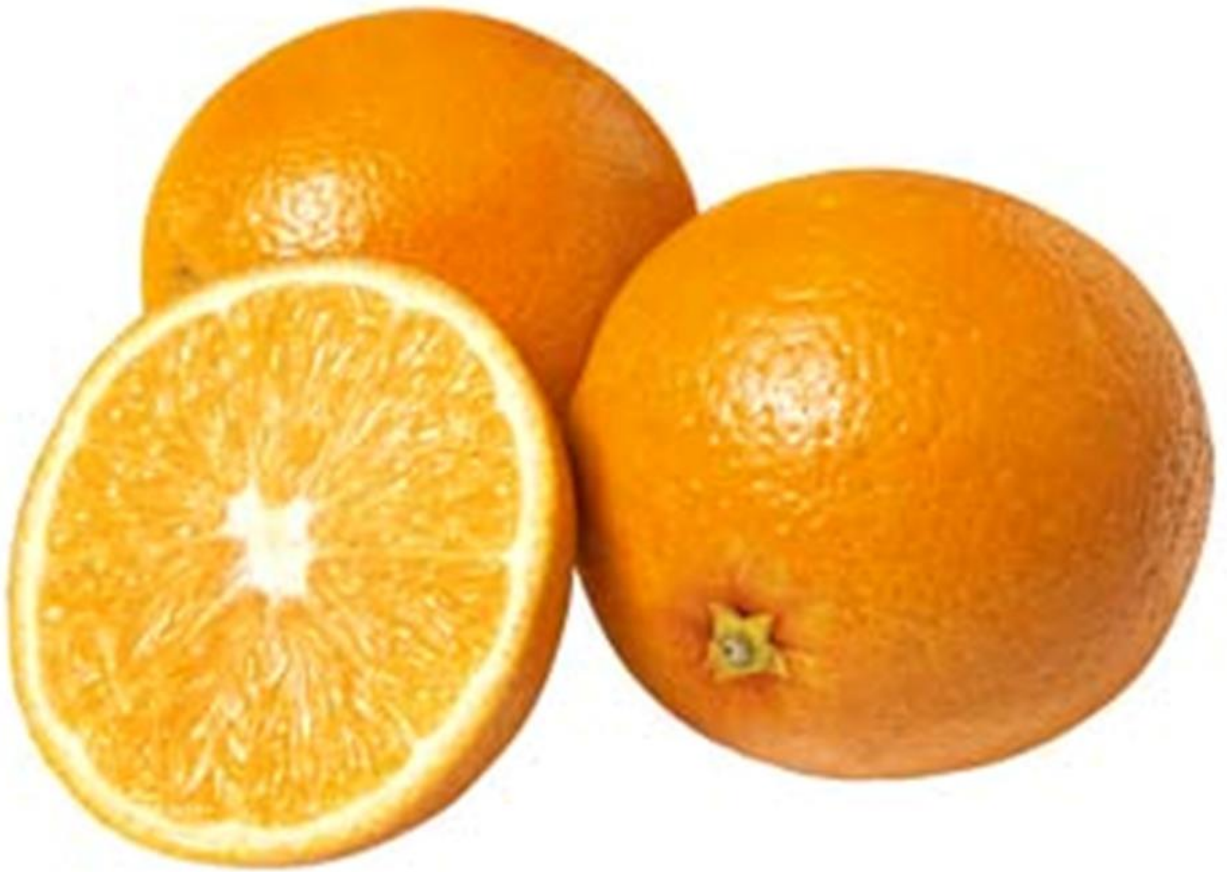
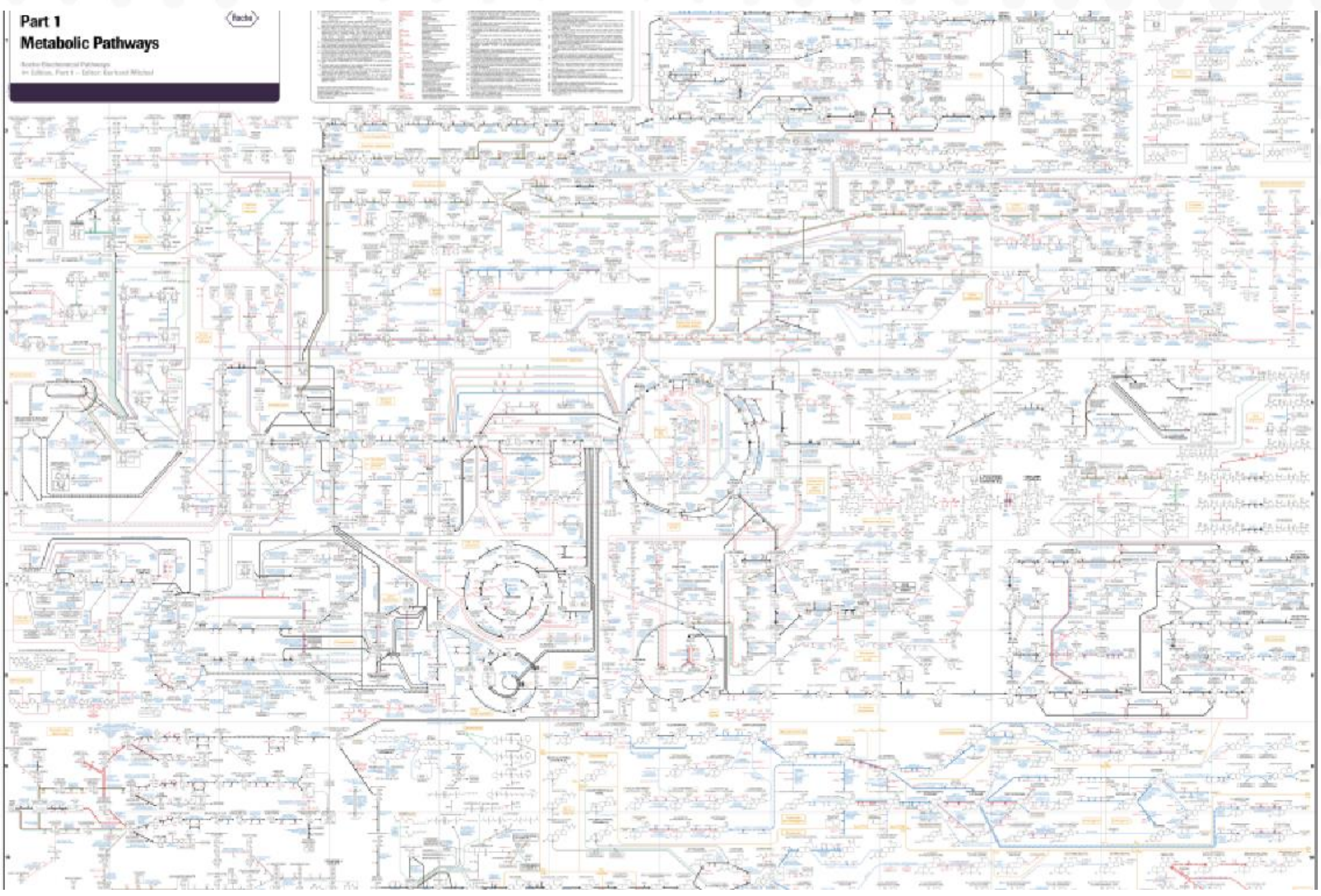
NUTRIENTS

Foods or liquids that supply the body with the chemicals necessary for metabolism.



ESSENTIAL NUTRIENTS

Those entities that the body either cannot synthesize or cannot synthesize quantities sufficient to meet needs.



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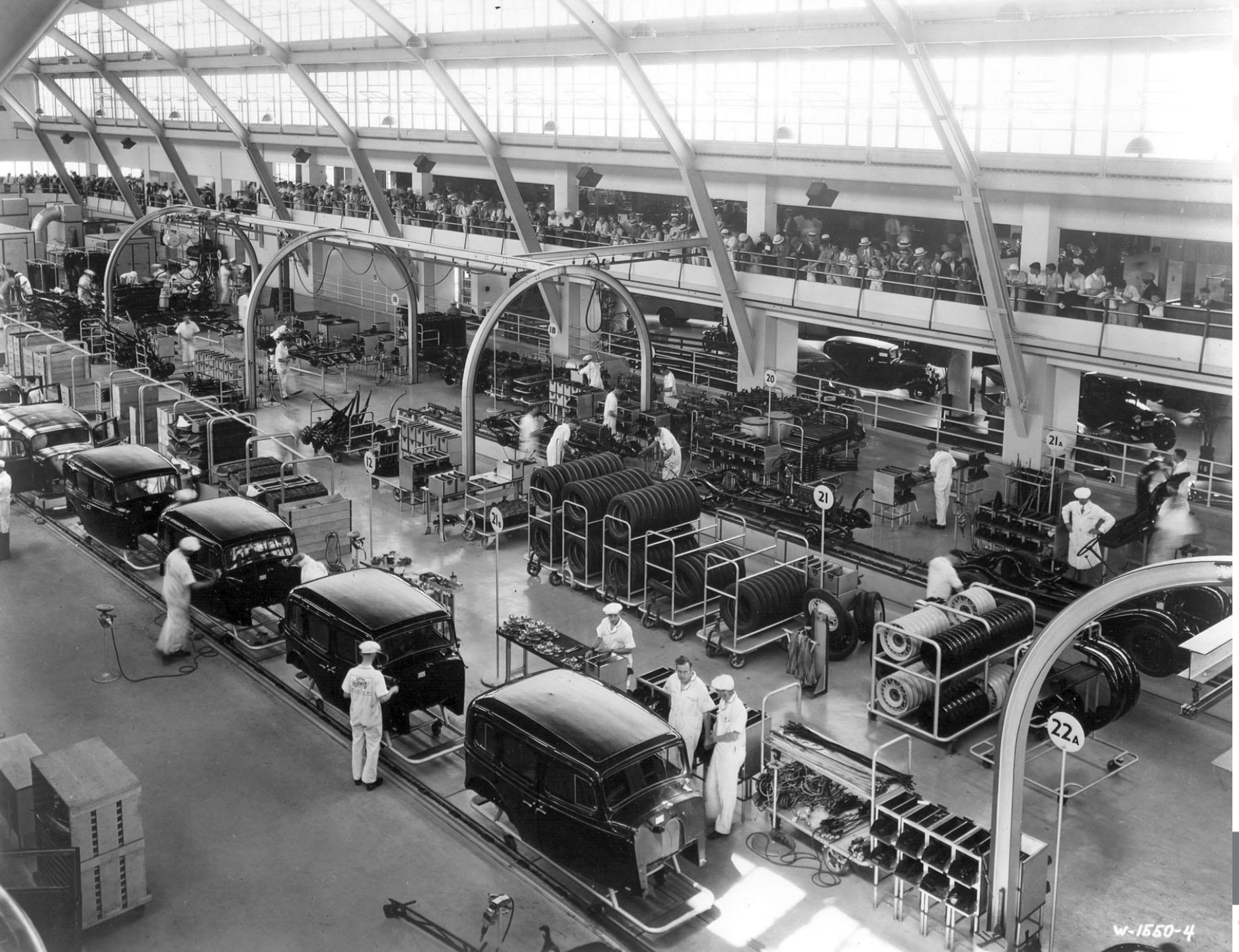

The Cellular Factory

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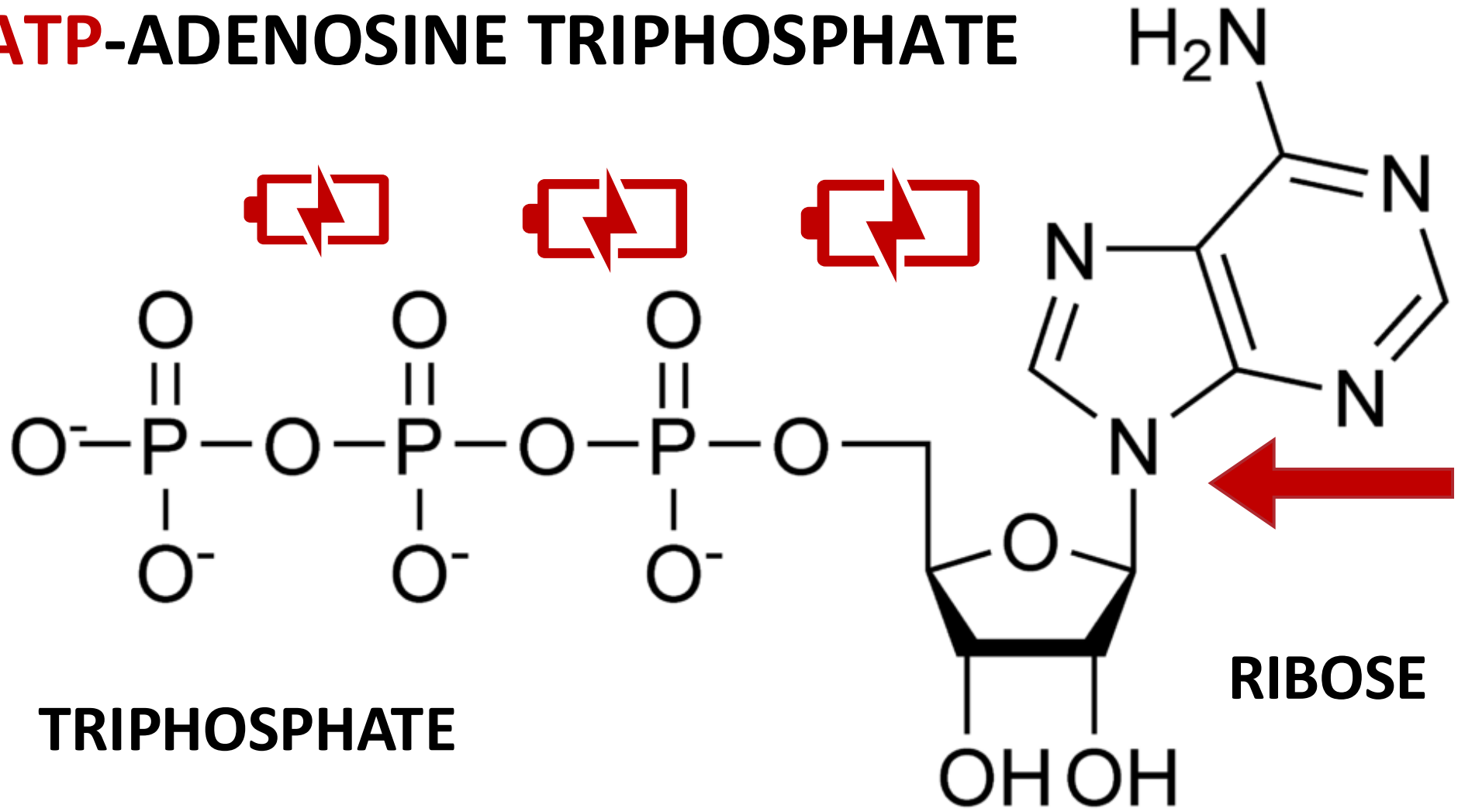
Bioenergetics

ADENINE

ATP-ADENOSINE TRIPHOSPHATE

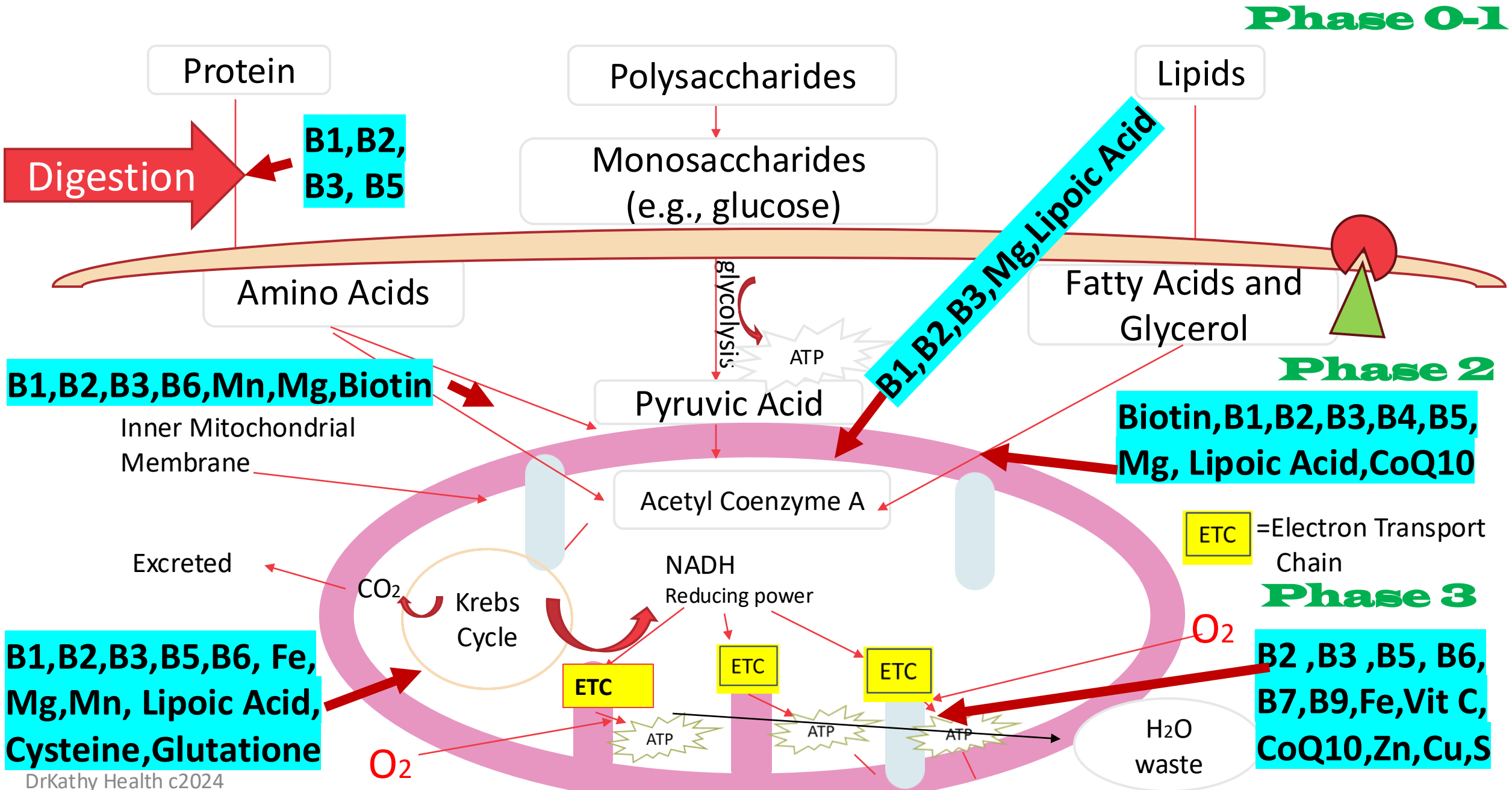


LIFE

TRIPHOSPHATE

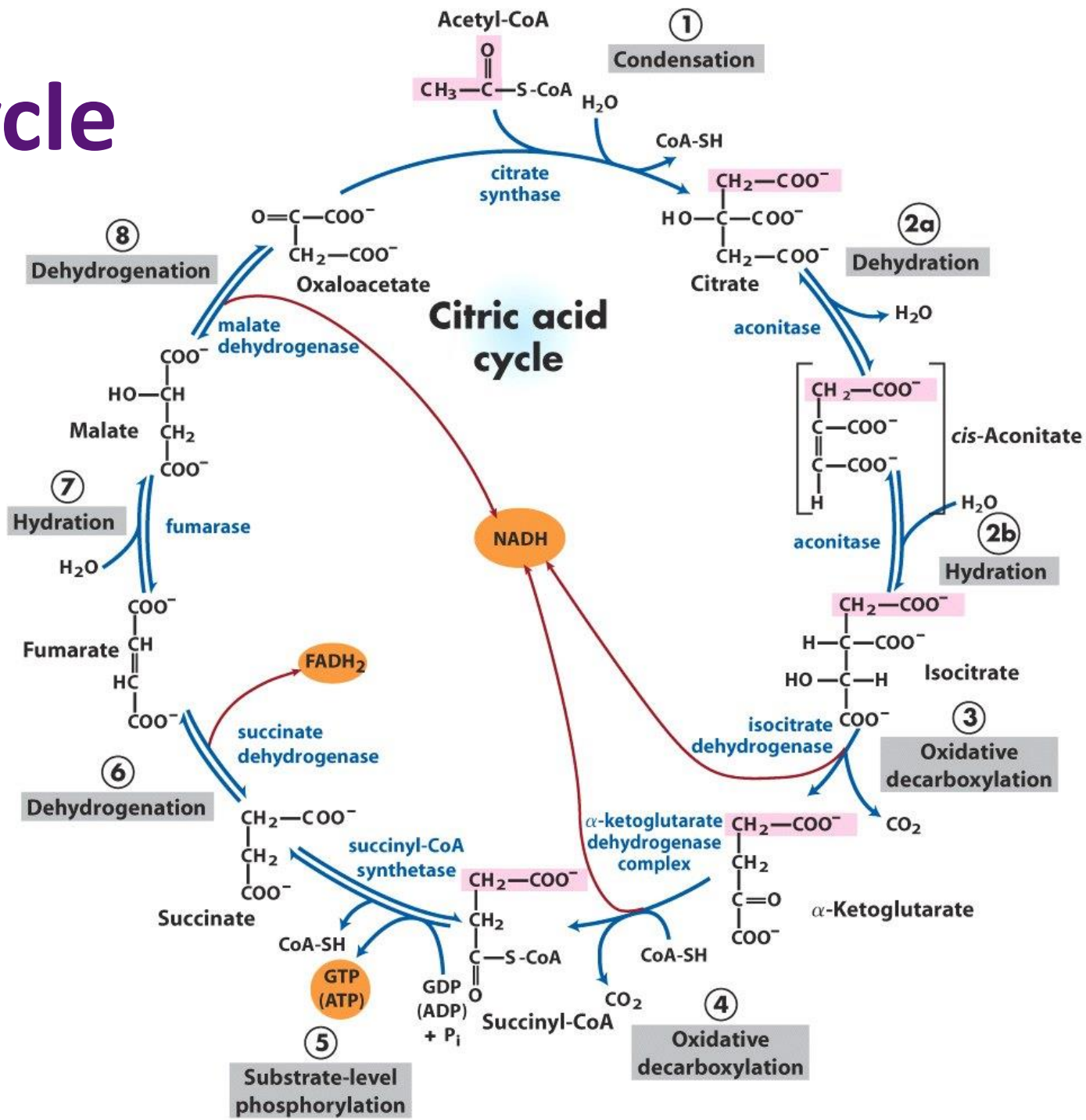
RIBOSE

Mitochondrial energy production (from food)



KREB'S Citric Acid Cycle

- Oxidative metabolism of Acetyl CoA to produce NADH/FADH/ATP
- Occurs in outer compartment.
- Requires B1, B2, B3, B5, lipoic acid, magnesium, iron, sulfur, phosphorus and **OXYGEN**



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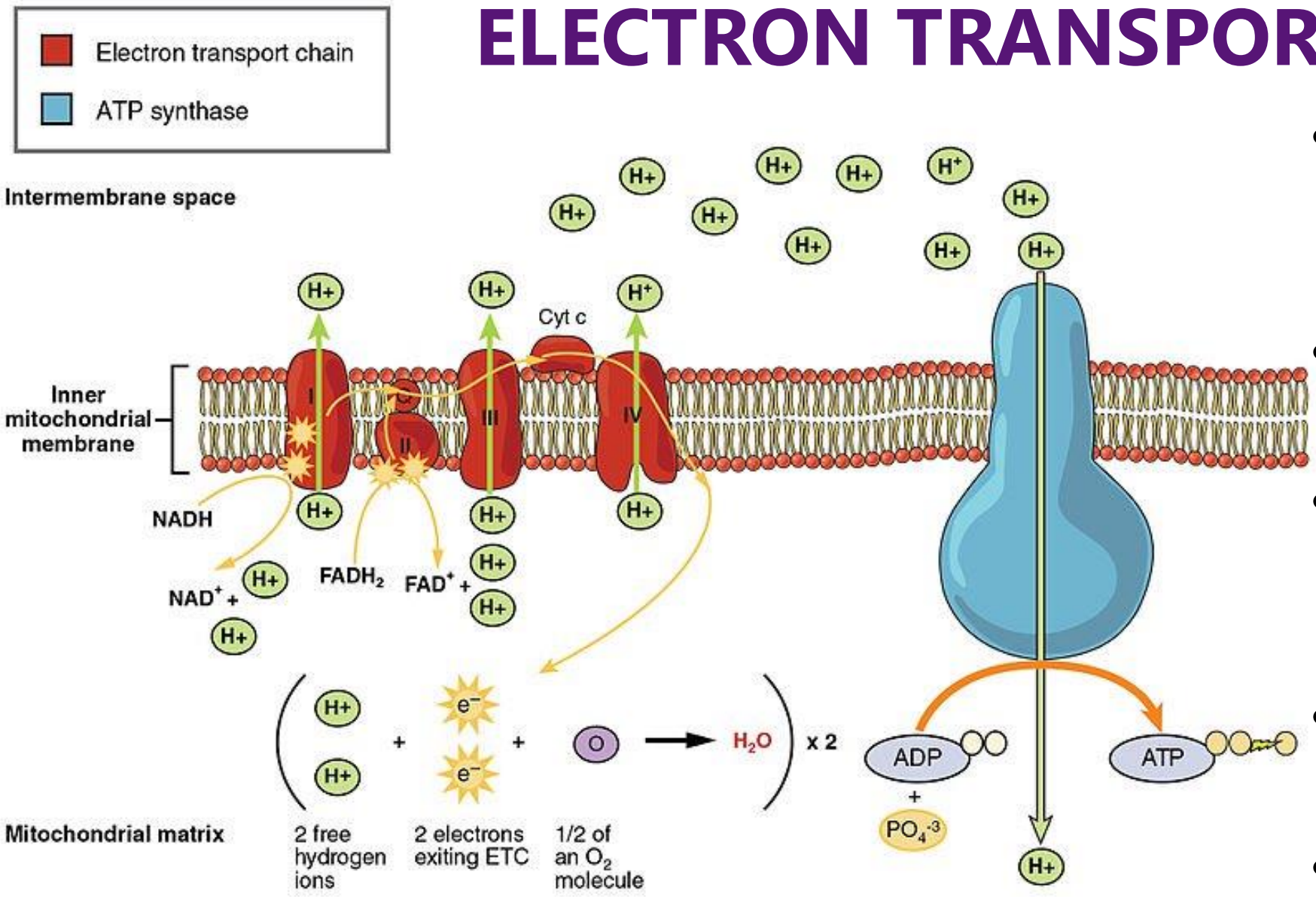
Oxidative phosphorylation via the ELECTRON TRANSPORT CHAIN



- Occurs in the inner mitochondrial membrane
- Each Mitochondrion contains 17,000 ETC's
- Key nutrients include iron-sulfur proteins, B2, B3, C, K, Mg, Zn
- **CoQ10** is a critical carrier molecule
- Potentially 38 ATP

NUTRIENT DEFICIENCY

An inadequate supply of nutrients from a **lack of consumption or absorption** resulting in malnutrition or disease.

The sub-clinical stages of marginal micronutrient deficiency

Stage	Etiology	Evidence
Stage 1	Depletion of Vitamins	Measurement of vitamin/mineral levels in blood tissue
Stage 2	Non-specific biochemical adaptation	Decreased excretion of metabolites in the urine
Stage 3	Secretion of micronutrient dependent enzymes or hormones reduced	**First physical signs; lack of energy, malaise, loss of appetite, insomnia**
Stage 4	Reversible impairment of metabolic pathways and cellular function	Morphological, metabolic or functional disturbances
Stage 5	**Irreversible tissue damage**	Clinical signs of micronutrient deficiency

Concept of borderline vitamin deficiencies Int J Vitam Nutr Res Suppl. 1985;27:61-73.

OBESITY-"Paradoxical State of Malnutrition"

Mis-Nourishment-How Nutrient Deficiencies Contribute to Obesity

- **Diminished Metabolism**-low Vitamin D production, low B-vitamins, minerals, Omega 3, decreased ATP
- **Impaired Satiety**, Increase Appetite and Cravings
- **Increased Inflammation**-Increased TNFa, Interleukin-1b, Interleukin 6
- **Microbiota Dysfunction**-Bacteroidetes vs Firmicutes

Kobylinska M, Atoskik K, Decyk A, Kurowska K. Malnutrition in Obesity: Is It Possible? Obesity Facts. 2022;15(1):19-25. Doi:101159/000519503. Epub 2021 Nov PMC8820192.

DRUG INDUCED NUTRIENT DEPLETION

Drug-induced nutrient depletion occurs when the medications we take for our chronic health conditions **deplete or block the absorption, storage, metabolism, or synthesis** of nutrients in the body.

- Mounting evidence indicate that several oral medications including antibiotics and PPIs unfavorably alter the gut microbiota; the resultant dysbiosis is implicated in the etiology and pathogenesis of obesity.

- The long-term use of PPIs is especially concerning due to numerous possible adverse side effects, including T2DM, dysbiosis, Clostridium difficult infection (CDI)-associated diarrhea, enteric infections, increased risk of community-acquired pneumonia, magnesium and vitamin B12 deficiency, osteoporosis, bone fractures and dementia.

Burmeister MA, Smith TE, Fincher TK, Weldon AJ. Evidence for proton-pump inhibitor (PPI)-associated dysbiosis in metabolically unhealthy obesity. Front Endocrinol (Lausanne). 2023 Jun 15;14:1205490. doi: 10.3389/fendo.2023.1205490. PMID: 37396171; PMCID: PMC10308999.

Medication associated weight gain

- Psychiatric/Neurologic-ssri, TCA, Lithium
- Antipsychotics-Olanzapine, Clozapine++, quetiapine, risperidone +
- Antiseizure-valproic acid, carbamazepine, gabapentin
- Insulin, Sulfonylureas, thiazolidinediones
- Corticosteroids (exogenous/endogenous)
- Antihistamine
- Beta-blockers-atenolol, metoprolol
- Hormonal Therapeutics-Contraception, HRT

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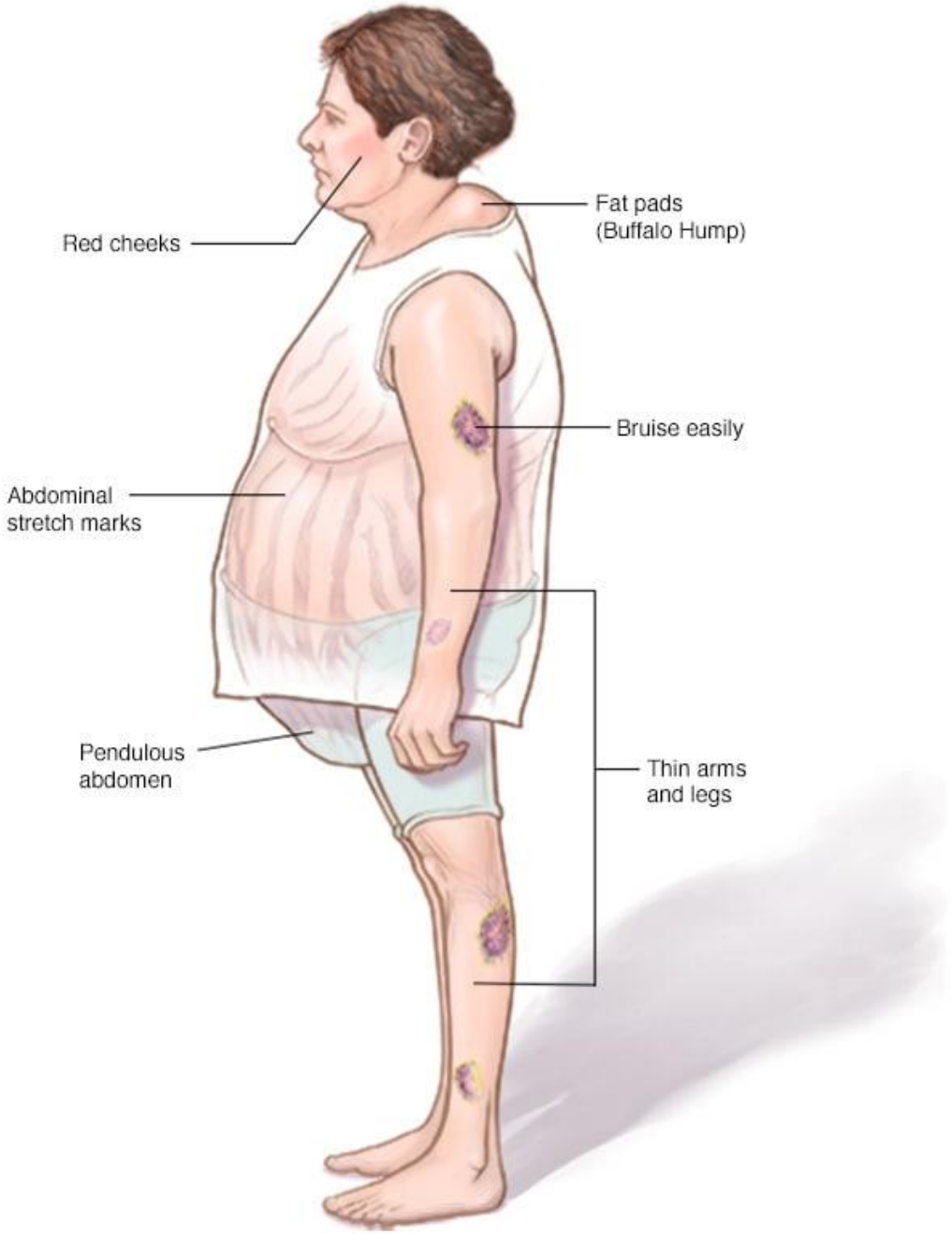
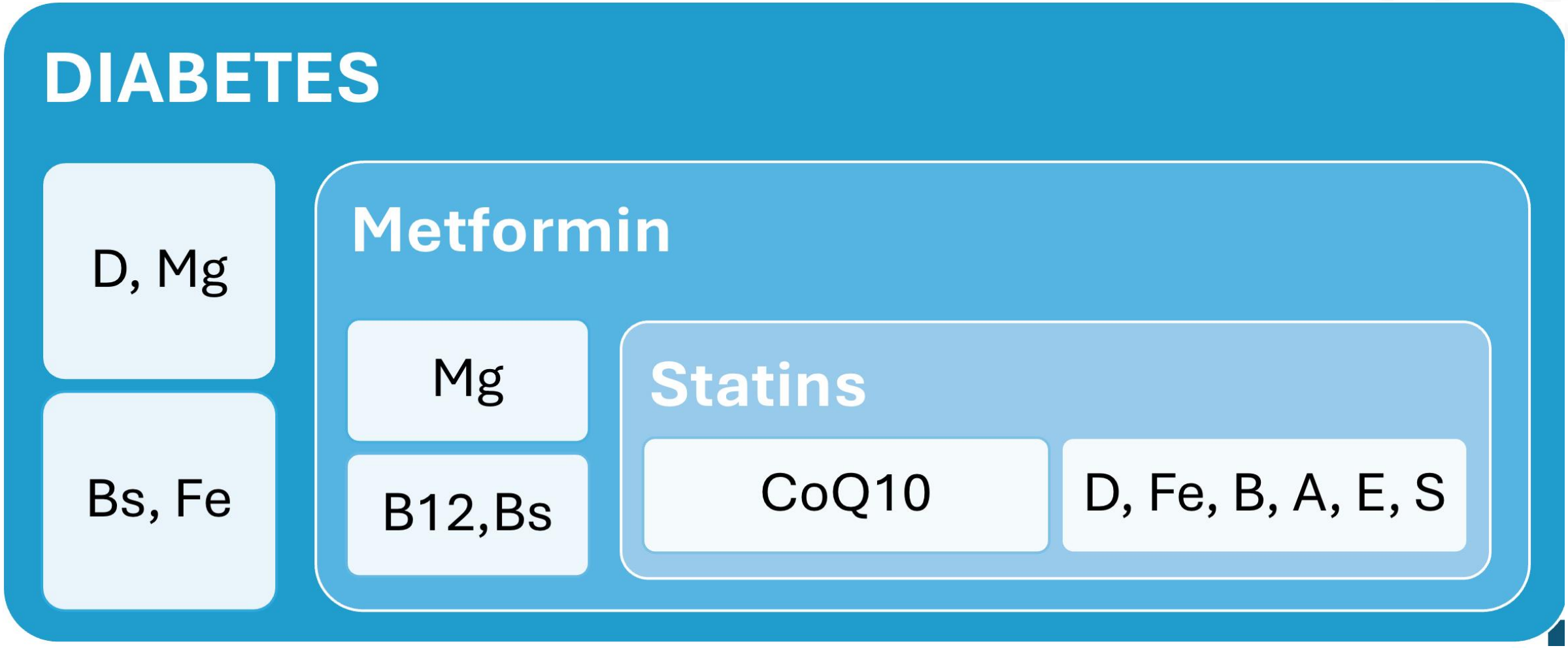


Corticosteroids

- Hypokalemia
- Loss of Muscle
- Osteoporosis
- Hyperglycemia
- Protein Catabolism
- Multiple mechanisms of increased adiposity

Disease Related Nutrient Deficiencies



What is foundational to optimal ATP production/ mitochondrial function?

FOOD-the foundational chemistry of life

- ***Acquired, digested, absorbed***, into tissue, into cell, through cytoplasm to mitochondria
- Large amounts of nutrients and co-factors **inside of the cell**

CULTURAL DIET

"Here we introduce a machine learning algorithm that accurately predicts the degree of processing for any food, indicating that over **73%** of the US food supply is ultra-processed."

Menichetti G, Ravandi B, Mozaffarian D, Barabási AL. Machine learning prediction of the degree of food processing. Nat Commun. 2023 Apr 21;14(1):2312. doi: 10.1038/s41467-023-37457-1. PMID: 37085506; PMCID: PMC10121643.

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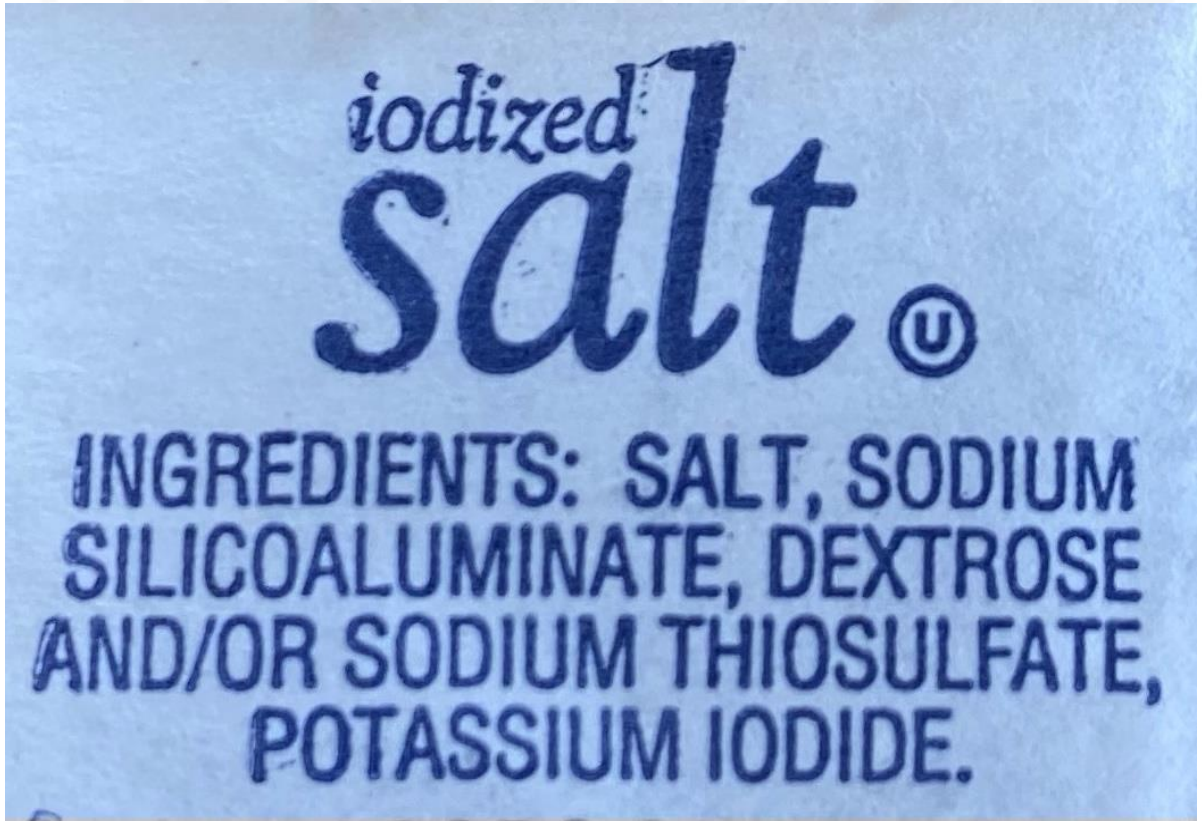
Metabolically **Toxic and Deficient**

The Standard American Diet (Culture) lacks the necessary biochemistries sufficient to populate metabolic processes, while at the same time containing chemistries disruptive or toxic to metabolic processes.



MUST GET THE FOOD AS RIGHT AS POSSIBLE!!!!

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FOOD FIRST!!! YOU ARE WHAT YOU EAT

- Most of our understanding of foods effect on health is based on the USDA tracking and understanding of 150 nutritional components.
- Currently, **26,625** distinct biochemical compounds have been identified in food.
- The number of secondary metabolites is estimated to exceed 49,000 compounds, indicating that the 26,000 chemicals currently assigned to food represent an incomplete assessment of the true complexity of the ingredients we consume.

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TEN SERVINGS OF VEGETABLES AND FRUITS A DAY

24 % reduction in risk of heart disease

33 % reduction in risk of stroke

28 % reduction in risk of cardiovascular disease

13 % reduction in risk of total cancer

31 % reduction in dying prematurely

Dagfinn et al., Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality—a systematic review and dose-response meta-analysis of prospective studies, International Journal of Epidemiology, Volume 46, Issue 3, June 2017, Pages 1029–1056, https://doi.org/10.1093/ije/dyw319

Help your patients with food

ASSESSMENT

HOW DOES THE WELLNESS PHARMACIST MONITOR AND OPTIMIZE THERAPEUTIC EFFECTIVENESS?

CONSULTATION APPOINTMENT
Therapeutic Relationship

This is where the **patient tells their** story. It is **all** of the things over the course of life that the body has had to process, adapt to or survive.

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TAKE A PICTURE

Worth a thousand words!!

Laboratory Assessment - Clues

The “Balance Sheet” of the Body

Serum, Salivary, Urine, Stool

Physician ordered

Pharmacist ordered

Patient ordered

Listen to the patient not the labs!

Looking for direction, not diagnosis.

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Blood Glucose Monitoring Proactive

- Inexpensive
- Informs patient to their unique glucose reaction to foods
- Used to assess post-prandial spike
- **Continuous Blood Glucose Monitoring** will be used increasingly for understanding unique circadian glucose response in “healthy” individuals

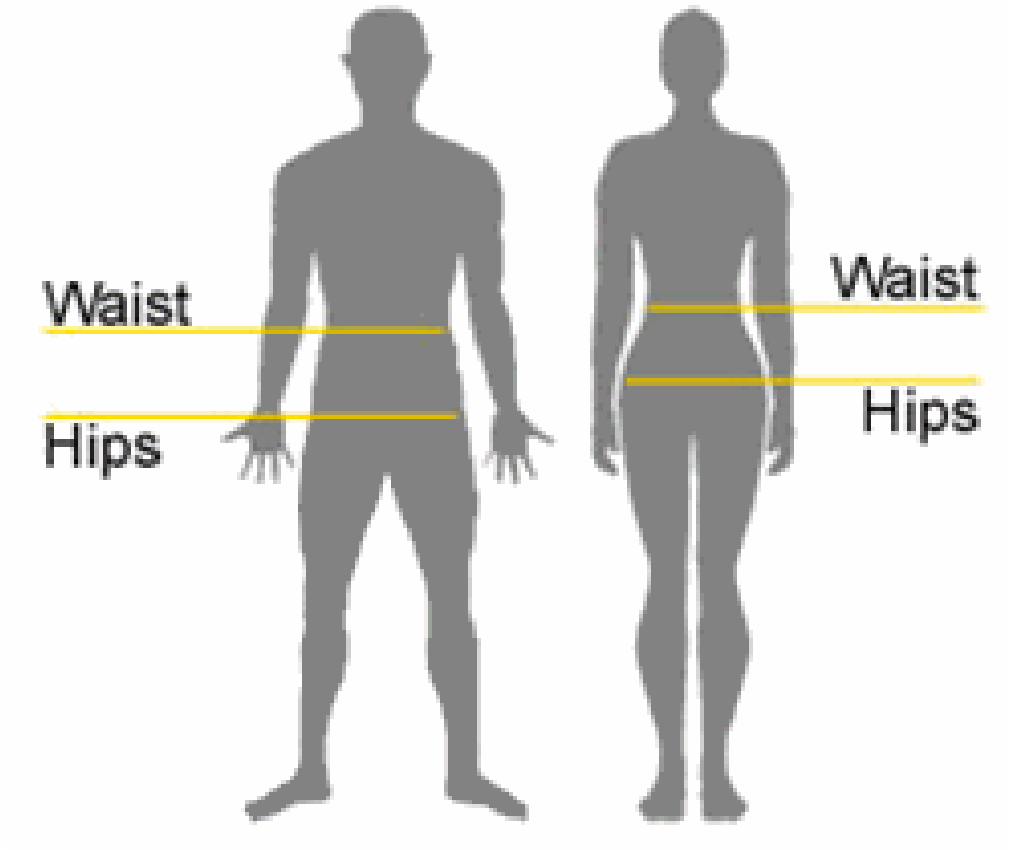
Waist-to-Hip Ratio (WHR)

- Efficient (cheap) indicator or measure of health and the risk of developing serious health conditions
- Takes into consideration differences in body structures

Waist-to-Hip Ratio (WHR) Norms				
Gender	**Excellent**	**Good**	**Average**	**At Risk**
Males	<0.85	0.85–0.89	0.90–0.95	≥0.95
Females	<0.75	0.75–0.79	0.80–0.86	≥0.86

Bray GA, Gray DS. Obesity. Part I--Pathogenesis. *West J Med*. 1988;149(4):429–441.

Waist-to-Hip Ratio (WHR) Activity



- The circumference of the abdomen, measured at the natural waist (in between the lowest rib and the top of the hip bone, iliac crest.
- The circumference of the hips at the greatest point (greater trochanter).

Weight-Least important number on the page (BMI?)

- Made up of total body water, lean body mass and body fat mass

Psychological weapon and source of trauma for many.

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Meet Mark

Height. 5’10”
Weight 230lbs
BMI 32(obese)

Target goal weight of 180lbs based on BMI

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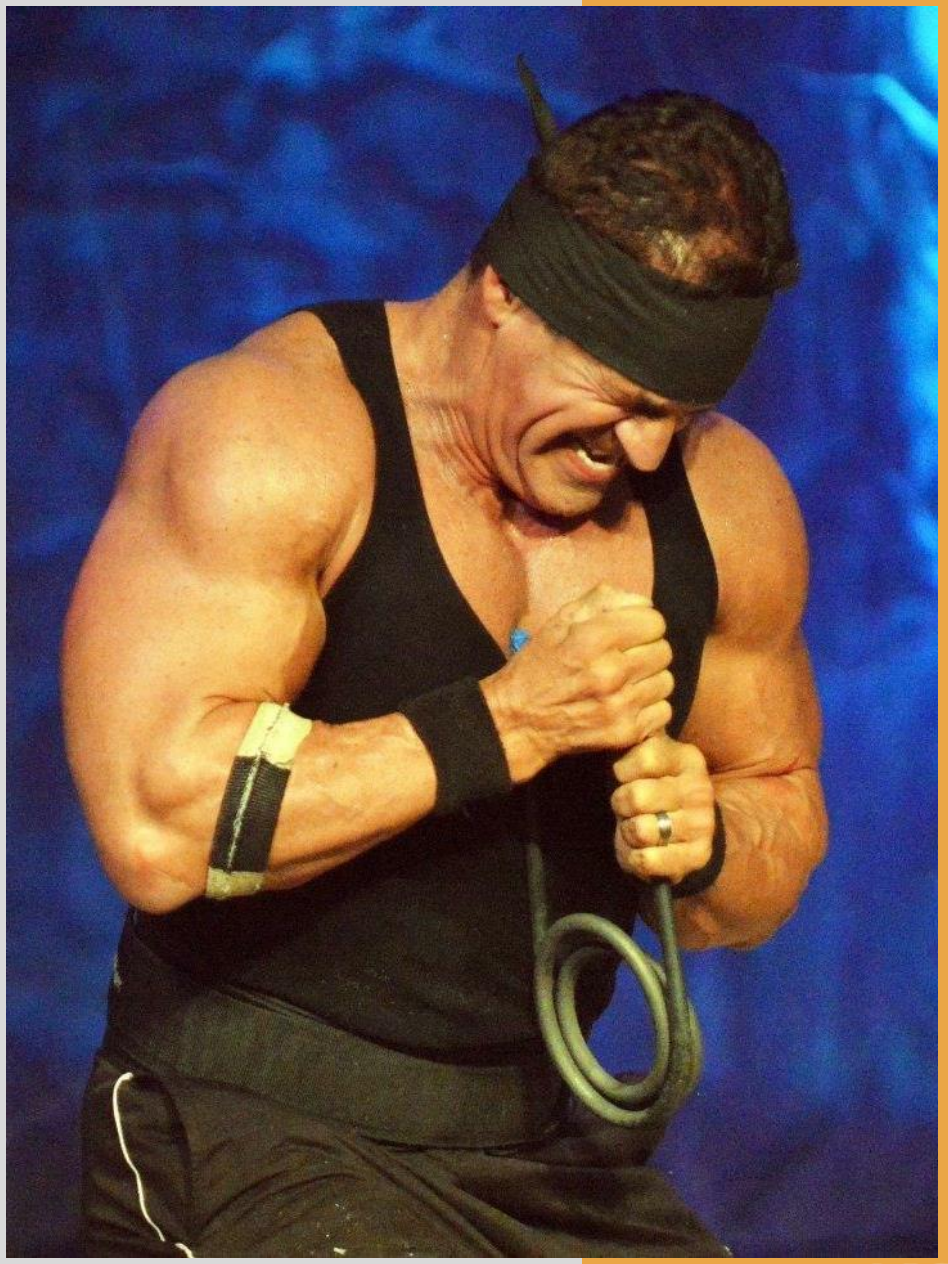
MARK…

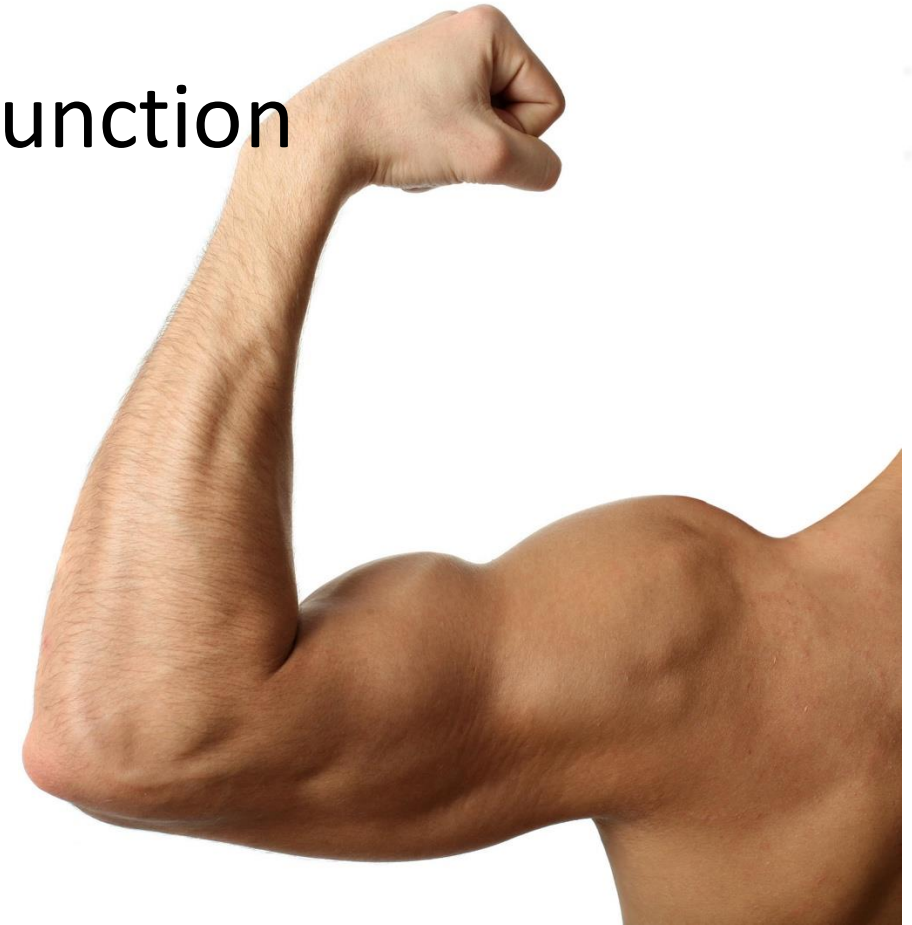
BMI 32
WEIGHT 23OLBS
HEIGHT 5’10”
4% BODY FAT



Body Composition Analysis

Skeletal Muscle Mass

- **CRITICAL** for optimal health and aging
- Muscle plays a large role in metabolic function
- **Muscle is primary store of mitochondria for energy production**
- Determinant of metabolic rate



Walston JD. Sarcopenia in older adults. *Curr Opin Rheumatol*. 2012;24(6):623–627. doi:10.1097/BOR.0b013e328358d59b

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Body Composition Analysis

Skeletal Muscle Mass

- **Sarcopenia**-an age related, involuntary loss of skeletal muscle mass and strength
- One of the most important causes of functional decline and loss of independence in older adults

Walston JD. Sarcopenia in older adults. *Curr Opin Rheumatol*. 2012;24(6):623–627. doi:10.1097/BOR.0b013e328358d59b

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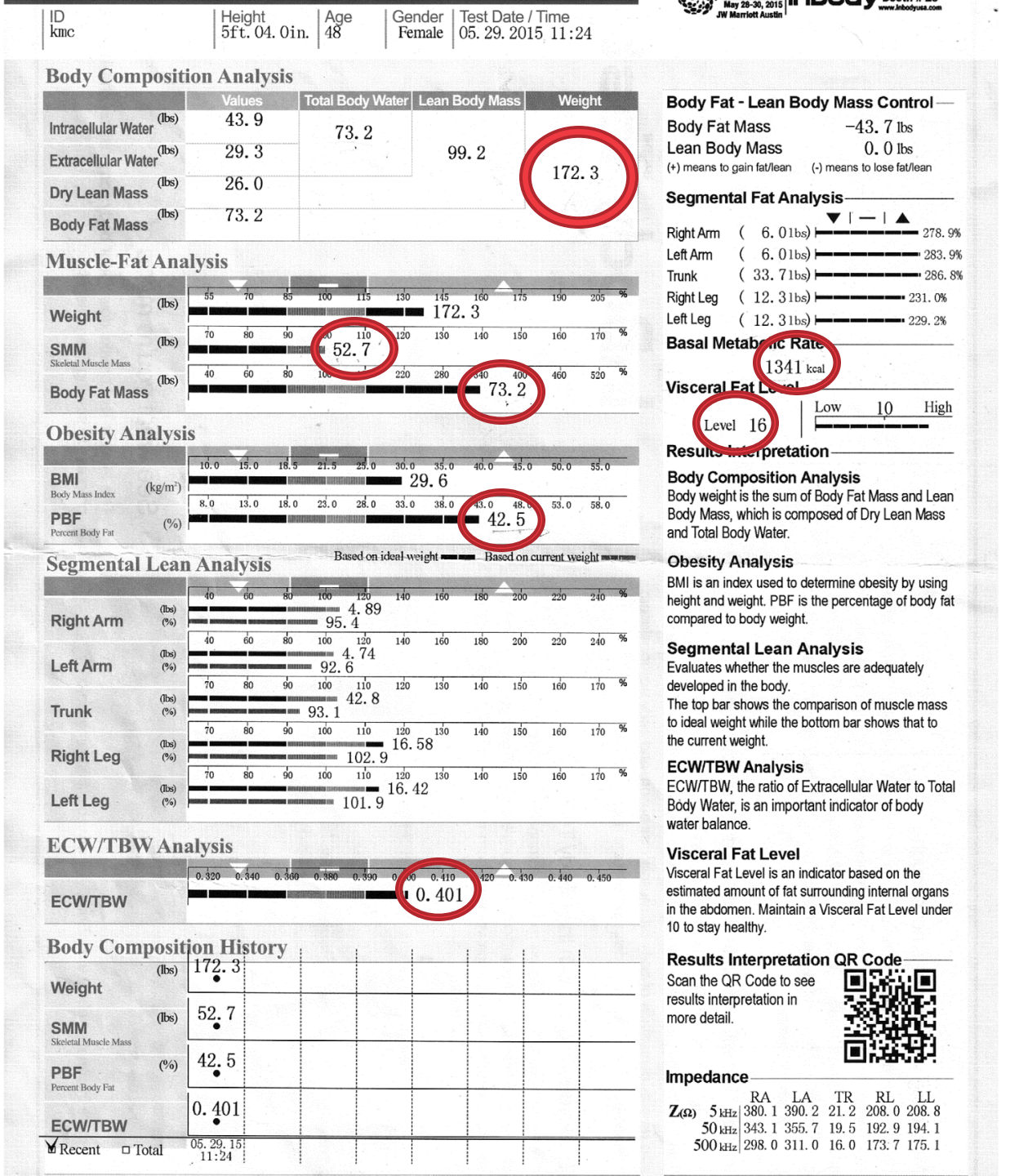
Body Composition Analysis

- Weight
- Skeletal Muscle Mass
- Body Fat Mass
- Percent Body Fat
- Extracellular Water/ Total Body Water
- Basal Metabolic Rate
- Visceral Fat Level



https://inbodyusa.com/general/570-result-sheet-interpretation/

Gaining and preserving muscle are critical to aging well and weight loss. Rarely is it worth losing weight at the expense of muscle.

MUSCLE=LONGEVITY

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Sarcopenia and GLP-1 therapies

DISUSE Syndrome

.

Andrew P. Wroblewski, Francesca Amati, Mark A. Smiley, Bret Goodpaster & Vonda Wright (2011) Chronic Exercise Preserves Lean Muscle Mass in Masters Athletes, The Physician and Sportsmedicine, 39:3, 172-178, DOI: 10.3810/psm.2011.09.1933

DISUSE Syndrome

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Andrew P. Wroblewski, Francesca Amati, Mark A. Smiley, Bret Goodpaster & Vonda Wright (2011) Chronic Exercise Preserves Lean Muscle Mass in Masters Athletes, The Physician and Sportsmedicine, 39:3, 172-178, DOI: 10.3810/psm.2011.09.1933

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Direction Assessment-TEST

- **Waist-to-hip Circumference**-Early and Cheap, better than weight
- **Body Composition (skeletal muscle mass, percent body fat, water ratio etc.)** Identify sarcopenia, reduced BMR, visceral fat
- **LABORATORY validation-Vitamin D**-Dose+Patient=Blood level
- **Blood Pressure and Heart Rate**-Na+/K+ balance, insulin
- **Daily Vegetable-Plant/PROTEIN Consumption**
- **Bone Density-**Catabolic vs Anabolic
- **Medication Profile**-Diagnosed CLUES-Pharmacists Expertise

Summary

- Anything compromising metabolism can lead to disfunction/obesity.
- Drug-induced metabolic compromise/nutrient deficiency should be assessed and managed by the wellness pharmacist.
- Medication effectiveness is predicated as an adjunct to diet and exercise.
- Must source, eat, digest and absorbs **large amounts** of metabolic chemistries.
- Plant and protein focused eating approach.
- Low muscle mass = low metabolic function = OBESITY…dementia, etc.

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Obesity is a SYMPTOM

WELLNESS PHARMACIST

Trusted health care professional extensively trained in therapeutics and metabolic optimization with the focus of proactively preserving health, function and minimizing the need for medications.

WELLNESS PHARMACIST

In addition to modern pharmaceuticals, the wellness pharmacist assists patients in selecting, managing, understanding and optimizing all chemistries, and therapeutic interventions, including but not limited to botanical, nutritional, supplemental, and lifestyle therapies.

QUESTIONS?

Kathy M. Campbell, PharmD

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