Healthy Behaviors for the Aging Population

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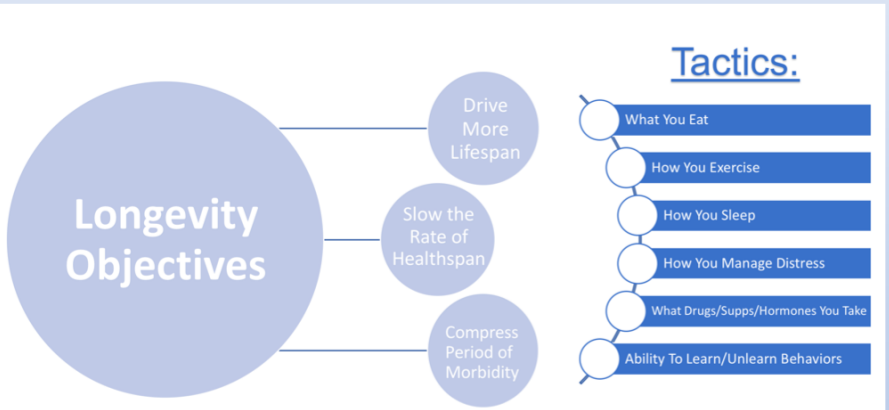
Introduction:

- According to a report in 2012 by the Agency for Healthcare Research and Quality (AHRQ), an estimated five percent of people account for 50% of the total healthcare expenditure in the United States. Individuals age 65 and older had the highest mean levels of health care expenditures relative to younger population at the top quantiles of the expenditure distribution (Cohen, 2012).
- This drastic skew in our healthcare expenditure shows how necessary it is for us to find a solution in order to flatten the skew or reduce the statistic all together. A theory to resolve this issue lies in the healthy behaviors and lifestyles people can adopt in order to increase their lifespan, healthspan, and reduce the utilization of healthcare expenses.
- These healthy behaviors include strategies for nutrition, exercise periodization, sleep, and reducing inflammation. As a healthcare provider, it is important to promote healthy behaviors to allow individuals to take a proactive approach on their health in order to live longer, healthier lives.

Sleep

- The relationship between duration of sleep and mortality has been described as a U-shaped association. This means that those individuals who have short sleep or long sleep durations are significant predictors of death (Cappuccio, 2010).
- Recent data has shown that the lack of sleep increases adverse health outcomes including total mortality, cardiovascular disease, type 2 diabetes, hypertension and respiratory disorders, in both children and adults. (Cappuccio, 2010)
- Those individuals who had sleep disturbances showed a two to three-fold higher risk of later onset type 2 diabetes (Kawakami, 2003).



Life-Long Exercise Periodization Model

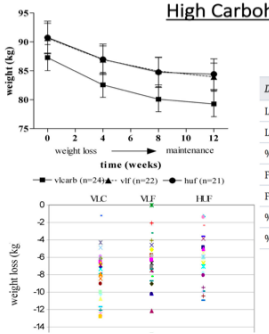
Ages: 20-30	Ages: 30-40	Ages: 40-50	Ages: 50-60s	Ages: 70s+
Hypertrophy	Muscle Maintenance	Cardiovascular Endurance	Strength Training	Type IIx Fiber Recruitment
High-intensity Interval Training	Endurance	Muscular Endurance		Controlled Plyos
				Proprioceptive/ Balance Training
				Cardiovascular Endurance

- Programming for the aging population becomes much more challenging with the recent research that increased mTOR activity is associated with accelerated aging (Leontieva, 2012).
- Li *et al.* showed in their study of 4,449 people that "low muscle strength is independently and significantly associated with increased risk of all-cause mortality among US older adults regardless of muscle mass, metabolic syndrome risk factors, sedentary time, or leisure time physical activity." (2017)

Nutrition

- Optimizing nutrition for IGF-1 pathway and mTOR pathway
  - Both IGF-1 and mTOr pathways are driven by amino acids, specifically leucine, and allows us to infer that we much moderate these pathways through nutrition (Wolfson, 2017).
  - IGF-1 is not only driven by amino acids but has been argued that it is also driven by carbohydrates through insulin (Melnik, 2011).
- Gut Microbiome
  - Dr. Shigenaga's research team has found that leakage of bacteria due to poor gut nutrition may be causing systemic inflammation underpinning insulin resistance, vascular dysfunction, and other metabolic derangements of aging and chronic disease (Shigenaga, n.d.)
- Time-restricted Eating
  - One of the main benefits of time-restricted eating is its effect on autophagy. Autophagy, is a process to clear our damaged cells. The more we can clear our damaged cells, the better quality of cells we will have (Longo, 2014).
- Ketogenic Diet
  - When comparing the effects of very low carbohydrate diets (VLCARB) to low saturated fat high carbohydrate diets on body composition and cardiovascular risk, researchers have found that isocaloric VLCARB resulted in similar fat loss than diets low in saturated fat. The researchers also found that isocaloric VLCARB were more effective in improving triacylglycerols, HDL-c, fasting and post-prandial glucose and insulin concentrations (Noakes, 2006).

Comparison of Isocaloric Very Low Carbohydrate/High Saturated Fat and High Carbohydrate/Low Saturated Fat Diets



DIET	VLCARB	VLF	HUF
Lean mass at baseline (kg)	46.5 ± 1.9	48.5 ± 2.6	46.4 ± 2.2
Lean mass after weight loss (kg)	43.9 ± 1.8	46.5 ± 2.3	45.0 ± 2.0
% change[2]	-2.6 ± 0.4[a]	-2.1 ± 0.4[a]	-1.4 ± 0.4[b]
Fat mass at baseline (kg)	37.6 ± 1.3	37.9 ± 2.2	40.7 ± 1.6
Fat mass after weight loss (kg)	33.1 ± 1.3	33.9 ± 2.2	36.3 ± 1.4
% change in fat mass	-4.5 ± 0.5[a]	-4.0 ± 0.5[a]	-4.4 ± 0.6[a]
% change in weight[3]	-8.0 ± 0.6[a]	-6.7 ± 0.7[a]	-6.4 ± 0.6[b]

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