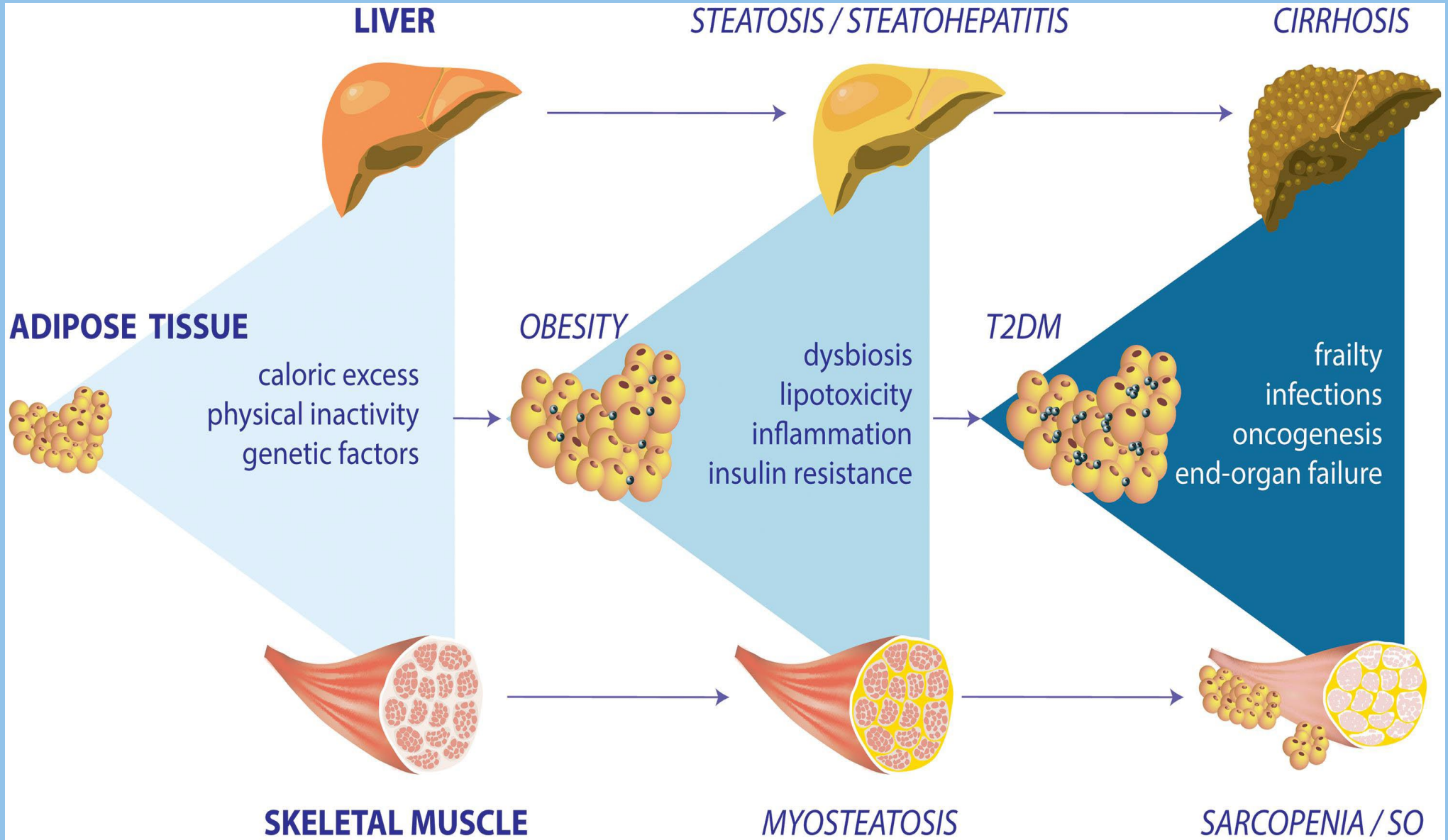
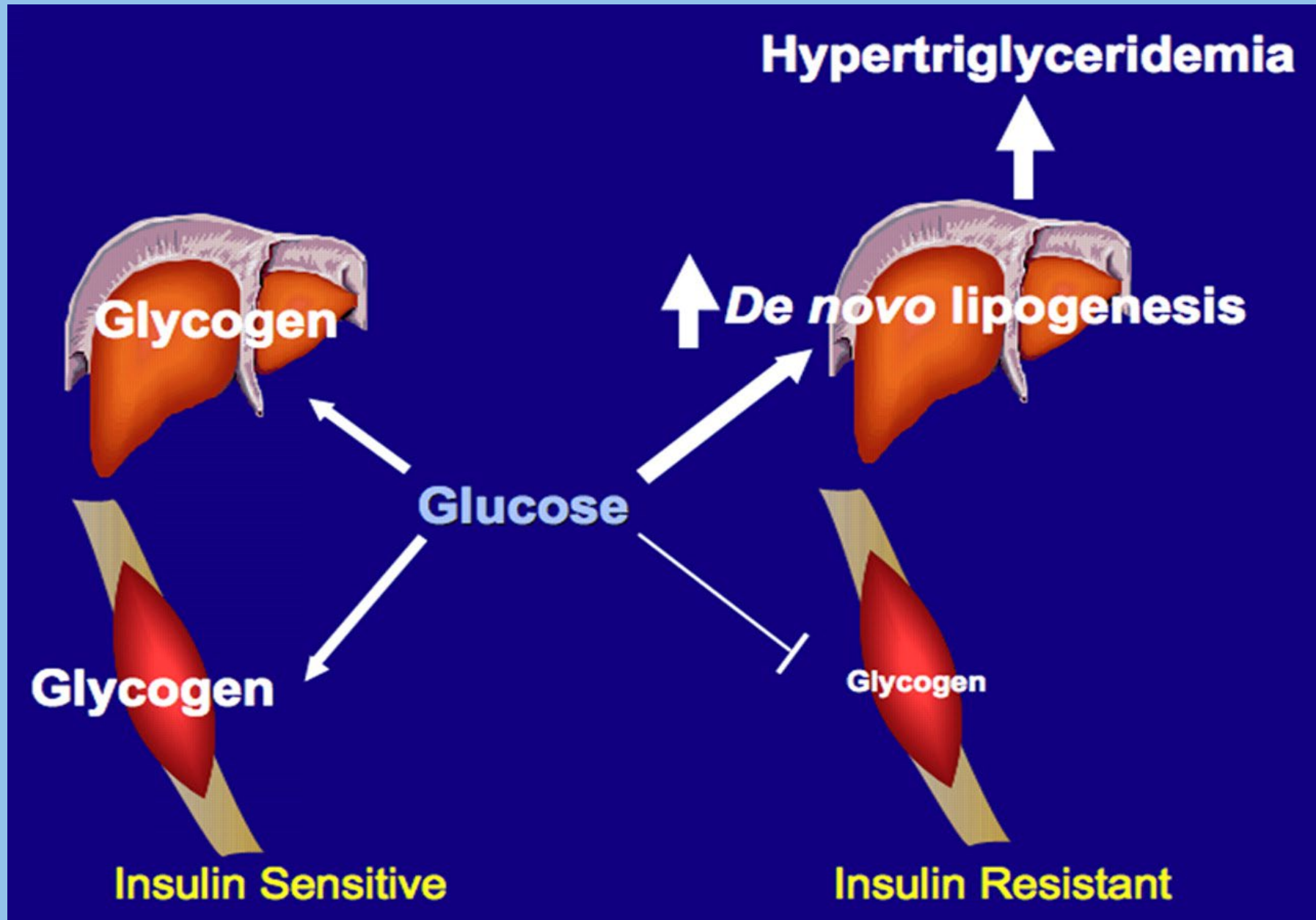


EXERCISE AND METABOLIC ASSOCIATED FATTY LIVER DISEASE

Youssef Barbour, MD

ANTHC Liver Disease & Hepatitis Program





BENEFITS OF EXERCISE IN THOSE WITH MAFLD

- Decreased liver enzymes
- Weight loss and prevention of further weight gain
- Decreased visceral fat and overall body fat%
- Decreased cholesterol
- Decreased liver triglycerides
- Decreased liver and peripheral insulin resistance
- Decreased liver and systemic inflammation
- Decreased hypertension
- Decreased hyperglycemia
- Increased high density lipoprotein

Zhang H, He J, Pan L, Ma Z, Han C, et al. JAMA intern Med 176: 1074-1082, 2016.

Romero-Gomez M, Zelber-Sagi S, Trenell M. J Hepatol 67: 829-846, 2017

AEROBIC EXERCISE

- Moderate to vigorous intensity 45-90% VO₂ max, 3-5 days/week for 30-60 minutes (150-300 minutes/week) recommended for liver health
- Moderate exercise (45-65% VO₂ max) reduces hepatic fat levels up to 43% and liver enzymes 29-34%

EXERCISE PREVENTS HEPATIC STEATOSIS

Independent and Synergistic Associations of Aerobic Physical Activity and Resistance Exercise with Nonalcoholic Fatty Liver Disease

Gut and Liver

Aim

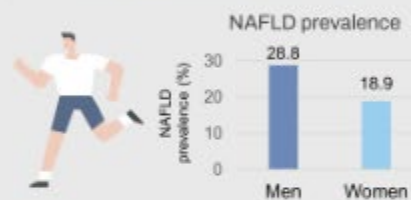
- To examine the independent and synergistic association of aerobic physical activity and resistance exercise with NAFLD in Korean population.

Methods

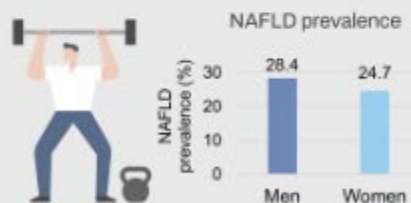
- Data:** Korea National Health and Nutritional Examination Survey 2007-2010
- Participants:** 14,977 adults aged ≥ 20 years old
- NAFLD definition:**
 - NAFLD liver fat score proposed by Kotronen et al. ≥ -0.640 .

Results

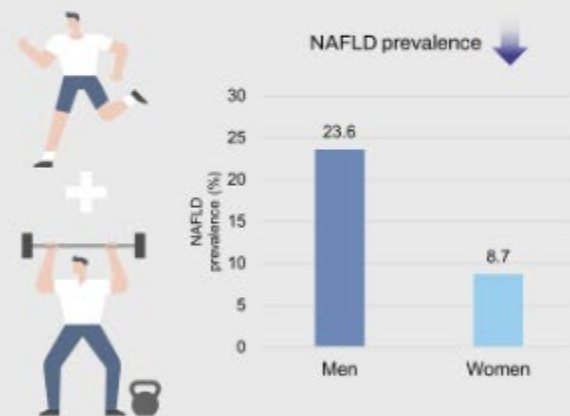
Only aerobic exercise



Only resistance exercise



Combined exercise aerobic + resistance



CONCLUSION

- Our study findings showed that the odds ratio of NAFLD decreased among people performed recommended physical activity compared to the physically inactive group, especially in men.
- Moreover, combining aerobic physical activity and resistance exercise had a synergistic preventive association for NAFLD compared to either aerobic exercise or resistance exercise in both Korean men and women.

EXERCISE MAKES PEOPLE HAPPY!!!

- Many studies have shown a strong correlation between physical activity and happiness
- Even 10 minutes of exercise/day was enough to elicit a positive response
- Physical activity, no matter type, boosts happiness (walk, run, yoga, dance, etc.)

EXERCISE IS BENEFICIAL IN MAFLD EVEN IN ABSENCE OF DIET

- Many studies have shown that aerobic exercise improves hepatic steatosis
- Effect of resistance exercise on MAFLD less consistent but does show improved muscle strength and function, as well as insulin sensitivity
- Significant correlation between changes in BMI and changes in liver fat content: for each 1% decrease in body weight, there is a 1% decrease in liver fat content
- Improvements in liver steatosis were also reported in those who exercise, in absence of weight loss
- Engaging in physical activity is beneficial even when exercise goals are not achieved
- Exercise should be proposed to all patients with MAFLD – individualized to their age and health status

Machado MV. Aerobic Exercise in the Management of Metabolic Dysfunction Associated Fatty Liver Disease. *Diabetes Metab Syndr Obes.* 2021 Aug 11;14:3627-3645. doi: 10.2147/DMSO.S304357. PMID: 34408459; PMCID: PMC8364841.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8364841/>

INDEPENDENT EFFECT OF EXERCISE ON BIOPSY-PROVEN NAFLD

- Systemic review of 9 studies in biopsy proven NAFLD
- Several studies have shown that exercise improves steatosis and may improve specific histological features of NASH (fibrosis and hepatocyte ballooning)
- No RCT have investigated effect of exercise on key endpoints in NASH, including cirrhosis and liver-related mortality
- Studies have not shown sustained benefits of exercise on hepatic steatosis and fibrosis in NAFLD following completion of exercise interventions (Got to keep exercising!!!)
- Additional long-term studies needed

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10029942/>

Chen G, Banini B, Do A, Lim JK. The independent effect of exercise on biopsy-proven non-alcoholic fatty liver disease: A systematic review. Clin Mol Hepatol. 2023 Feb;29(Suppl):S319-S332. doi: 10.3350/cmh.2022.0366. Epub 2022 Dec 14. PMID: 36517000; PMCID: PMC10029942.

EFFECT OF AEROBIC EXERCISE ON NASH AND LIVER FIBROSIS IN PATIENTS WITH NAFLD

- Systematic literature review and meta-analysis of 24 studies; 18 RCTs and 6 non-RCTs encompassing 1014 patients with NAFLD
- Outcomes based on liver transaminases, lipids, body weight, and imaging (MRI or TE)
- Lack of studies using liver histology as outcome
- Liver fat is decreased by aerobic exercise with concomitant decrease in liver enzymes
- Aerobic exercise improved cardiorespiratory fitness
- Further studies needed to determine impact of aerobic exercise on hepatic inflammation and fibrosis

EXERCISE RESOURCES

EXERCISE IS MEDICINE

Add years to your life.
One step at a time.



Want to move better? Feel better? Get healthier?
Regular physical activity can give you all that and MORE.
Take your first step today.

The Miracle Drug: Exercise is Medicine®

Exercise
is Medicine® | AMERICAN COLLEGE
of SPORTS MEDICINE

In an era of spiraling health care expenditures, getting patients to be more active may be the ultimate low-cost therapy for achieving improved health outcomes. Studies show that regular physical activity (PA) has health benefits at any body weight and is critical for long-term weight management. Decades of research have shown that exercise is as effective as prescription medication in the management of several chronic diseases. Just as weight and blood pressure are addressed at nearly every health care visit, so should attention be given to PA.

Assessment: Use the *Physical Activity Vital Sign* to Assess Weekly PA Levels

Add these two simple questions to the health history form and electronic health record to determine if the patient is meeting the PA guidelines:

1. On average, how many days/week do you engage in moderate to vigorous PA (like brisk walking)? _____ days
 2. On average, how many minutes do you engage in PA at this level? _____ minutes
- Total Activity (days/week x minutes/day) = _____ minutes/week**

Brief Advice/Prescription: Basic Exercise Recommendations

- Encourage your patient to meet the PA guidelines (see chart). At minimum, adults should be more active over the course of a day (i.e., take frequent breaks from sitting, walk the dog, use the stairs). Every minute counts! Children and adolescents should engage in sports, dance, outdoor recreation and active games.
- Provide the [EIM "Sit Less, Move More"](#) handout to your patients. The [EIM Rx for Health Series](#) also provides condition-specific handouts.

2018 Physical Activity Guidelines for Americans

Age (yrs old)	Aerobic Activity Recommendations	Muscle Strengthening Recommendations
6-17	60 minutes of moderate or vigorous physical activity (PA)/day including at least 3 days of vigorous PA/wk	3 days/week and included as part of the 60 minutes of daily PA. Also include bone-loading activity
18-64	150-300 minutes of moderate PA/wk, 75 minutes of vigorous PA/wk or equivalent combination spread throughout the week	Muscle strengthening activities at moderate or greater intensity (all major muscle groups) on 2 or more days/wk
65+	Same as adults, or be as active as abilities and health conditions allow	Same as adults, but include balance training and combination activities (strength and aerobic training together)

Visit: www.exerciseismedicine.org

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[Lower blood sugar to manage diabetes](#)

[Lower blood pressure](#)

[Stop smoking, vaping or chewing](#)

[Be active with your children](#)

Lose weight or prevent diabetes

Offered online

Omada runs Alaska's 12-month free program to lose weight or prevent diabetes. Hundreds of participating Alaskans have lost more than 7,000 pounds in total.

You're matched with a coach for support.



<https://health.alaska.gov/dph/Chronic/Pages/freshstart/loseweight/default.aspx>

ANCHORAGE – SCF FITNESS CLASSES AT MT. MARATHON BUILDING

October

Exercise Classes



Scan the QR Code or visit:

[southcentralfoundation.com/services/physical-therapy-exercise/](https://www.southcentralfoundation.com/services/physical-therapy-exercise/)

Bookmark this page:
<https://www.southcentralfoundation.com/services/physical-therapy-exercise/>

MONDAY

11-11:50 a.m.
Tabata

Noon-12:50 p.m.
TRX® Strength

1-1:50 p.m.
Living Strong

TUESDAY

6:45-7:30 a.m.
Boot Camp

9-9:50 a.m.
**Healthy Back
Strong Core**

10-10:50 a.m.
Functional

WEDNESDAY

11-11:50 a.m.
Yoga

Noon-12:50 p.m.
Boot Camp

Noon-12:50 p.m.
Spin

THURSDAY

6:45-7:30 a.m.
Boot Camp

10-10:50 a.m.
**Functional
Strength and
Balance**

11-11:50 a.m.

FRIDAY

11-11:50 a.m.
Prenatal Yoga

Noon-12:50 p.m.
Boot Camp

CANCELLATIONS

Tuesday Oct. 3
All Classes Canceled

Wednesday Oct. 4
All Classes Canceled
(except spin)

Thursday Oct. 5
6:45-7:30 am.
Boot Camp

EXERCISE CLASSES AVAILABLE ON ANMC CAMPUS

Exercise Classes

Boot Camp

Designed to improve strength and endurance with a fun mixture of cardio bursts, plyometrics, core, strength, and body weight trainings. Modifications can be made for any level.

F.I.T. (*Functional Integrated Training*)

A dynamic workout that utilizes vitality, performance and reconditioning, kettlebell, and TRX® equipment to improve balance, agility, and dynamic strength. Reach goals such as weight management, improved daily functionality, and enhanced sport performance. All movements can be regressed and progressed to meet individual fitness levels and goals.

Functional Strength and Balance

Improve movement, decrease pain, and learn how to exercise anywhere without needing equipment. Learn real life movements to increase your flexibility, strength, and balance all at the same time.

Healthy Back Strong Core

Learn how to relieve back pain while strengthening vital core muscles. A strong core is necessary for quality, functional movement. Learn basic core strength exercises that will help decrease pain and improve quality of life.

Living Strong

Enhance the quality of your life and your ability to be strong and independent by taking part in the Living Strong class.

Pilates/Core

A strong core is essential for proper function, efficient movement, optimal performance, and overall strength and power. Pilates will teach you how to engage your core while challenging your entire body.

Prenatal Yoga

Prenatal yoga is a way to maintain a healthy mind throughout pregnancy. It focuses on strength and flexibility during pregnancy. Prenatal yoga will also teach relaxation poses that can assist in the labor process.

Self Myofascial Release

Myofascial release is a self-massage technique utilized to help relieve pain and tension due to injury or stress. It involves releasing the fascia (*connective tissue*) that surrounds each muscle and interconnects all internal parts of the body. Various instruments are utilized to release muscular tension.

Spin

A high-intensity aerobic workout that simulates outdoor cycling with motivation and mind/body connection to improve aerobic fitness. This class is high intensity: you will begin sweating after performing the activity for approximately 3-5 minutes; breathing will become deep and rapid.

TRX® Strength

A complete body workout using multiple planes of motion and your body weight to build power, strength, flexibility, balance, mobility, and to prevent injuries. You choose the intensity.

Yoga

Looking to relieve back pain, strengthen your core, improve your flexibility, relieve stress, or perhaps gain a competitive edge in sports? Join this all levels class.

Tabata GXTM

A group fitness class that gives participants a dynamic warm up utilizing full range of movement to get the body warm and prepared for a fun and invigorating interval training class. The intervals will include progressive HIIT's (*High Intensity Interval Training*), max interval, and mixed intervals. The class will also include one group or partner game to create camaraderie,

For more information, visit:
<https://www.southcentralfoundation.com/services/physical-therapy-exercise/>

CARDIOVASCULAR ZONES

ZONE	% OF MAX HR	EXERTION LEVEL	FITNESS GOAL
5	90 - 100%	MAX	FOR FIT ATHLETES IN VERY BRIEF DURATIONS, DEVELOP FAST-TWITCH MUSCLE FIBERS TO BOOST SPRINT SPEED
4	80 - 90%	HARD	INCREASE ANAEROBIC THRESHOLD AND MAX CAPACITY FOR SHORTER EFFORTS
3	70 - 80%	MODERATE	IMPROVE AEROBIC FITNESS AND MUSCLE STRENGTH
2	60 - 70%	LIGHT	BUILD BASIC ENDURANCE, FAT BURNING, SUSTAINABLE FOR LONG PERIODS OF EXERCISE
1	50 - 60%	VERY LIGHT	WARM UP, COOL DOWN, AND ACTIVE RECOVERY
0	< 50%	REST	NO MEANINGFUL STRAIN ON THE BODY

THANK YOU!!!

HOW DO YOU FIGHT MAFLD
WHEN IT TURNS COLD AND DARK?

