

# Resistance Training for Diabetes: Building the Case Strength

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# Objectives

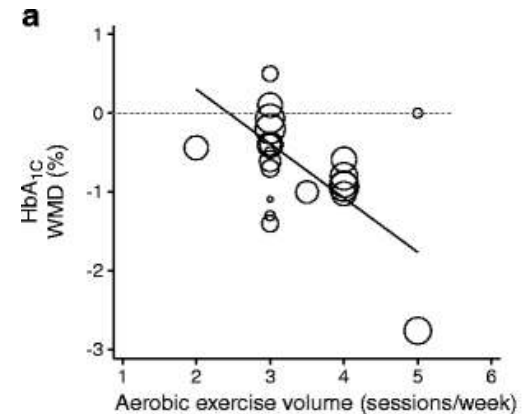
1. Define resistance training.
2. Describe relationship between resistance training and glycemic control.
3. Describe the benefits of resistance training for diabetic patients.
4. Outline components of an effective resistance training program

# Resistance Training (RT)

“A form of physical activity that is designed to improve muscular fitness by exercising a muscle or a muscle group against external resistance.” *American College of Sports Medicine*

# Exercise Benefits: Aerobic Training

- Aerobic training established exercise therapy for type 2 diabetes (T2DM) patients (American Diabetes Association, 2012)
  - Improve metabolic panel, Hemoglobin A1c (HbA1c)
- Health gains dependent on getting adequate amount of exercise
  - Systematic review and meta-analysis found that each aerobic exercise session/week 0.39% reduction in HbA1c (Umpierre, Ribeiro, & Schaan, 2012)
  - 150 minutes/week of moderate-intensity exercise

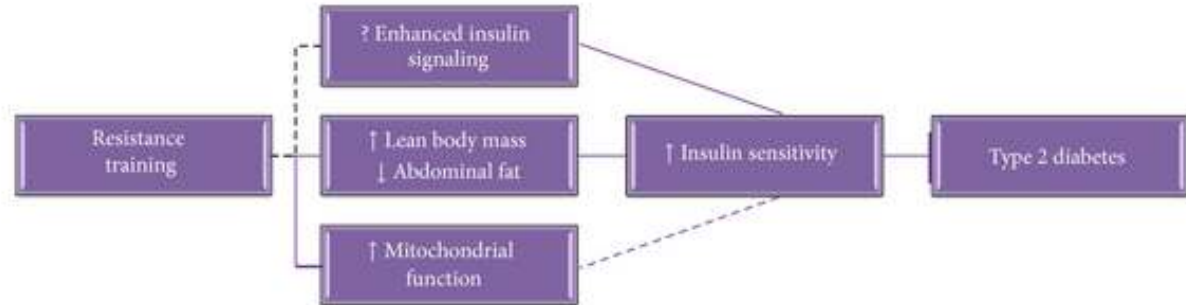


# Exercise Benefits: RT

- Glycemic control approximately -0.34% reduction in HbA1c in systematic review and meta-analysis (Ishiguro, Kodama, Horikawa, Fujihara, Hirose, Hirasawa et al, 2016)
  - Large variability between studies
- Greater effect on HbA1c when:
  - BMI: <32
  - Recency of Diagnosis: < 6 years
  - Baseline HbA1c: >7.5
  - Sets per bout of exercise (>21) & sets per week (>60)
- *Intensity, frequency/week, intervention period, age, sex no significant effect on HbA1c*

# RT and Glycemic Control

- Increased muscle mass yield increase glucose uptake
- Enhanced insulin action at skeletal muscle
  - Increased glucose transporter-4, insulin receptor, protein kinase
  - Patients with increased duration of diabetes see less of this benefit due to beta cell function decreases



# RT Benefits Con't

- Particularly effective in newly diagnosed overweight, patients with poorer glucose control
  - Modest HbA1c reduction from RT alone
- Bone mineral density maintenance, osteoporosis prevention
- Increased muscle strength (McGinley, Armstrong, Boule & Sigal, 2015)
  - Older adults with diabetes experience more rapid declines in muscle strength & quality than those without (Park, Goodpaster, Strotymeyer, de Rekeneire, Harris, Schwartz et al, 2006)
  - Diabetes, especially poorly controlled, is an independent risk factor for lower muscular strength (Park, Goodpaster, Lee, Kuller, Boudreau, de Rekeneire N et al, 2009)
  - Essential to performing activities of daily living (Kalyani, Saudek, Brancati, Selvin, 2010)
- Enhance flexibility
- Improve body composition

# RT Recommendations

American College of Sports Medicine Position Stand: Exercise and Type 2 Diabetes (Albright, et al 2000)

- *In absence of contraindications: musculoskeletal injury, uncontrolled HTN, severe neuropathy, foot lesions, retinopathy*
- Well-rounded program aimed at improving muscular strength & endurance
- 2 days/week
- 8-10 exercises involving major muscle groups 15-20 repetitions per exercise
  - Free weights, resistance bands, weight machines
- Rate of progression: focus on frequency and duration vs. intensity
- RPE 10-12

Resource: <https://www.acsm.org/docs/brochures/resistance-training.pdf>



# Example RT Workout

*Strength & Endurance: 70% 1RM volume 3-4 sets of 12-25 repetitions with 1-2 minutes between sets*

<b>Muscle Group</b>	<b>Free-Weight*</b>	<b>Machine-Based</b>	<b>Body Weight</b>
Chest	Bench press	Chest press	Wall push up
Back	Bent over row	Lat pull down	Band Rows
Shoulder	Dumbbell lateral raise	Shoulder press	Arm circles
Bicep	Dumbbell curl	Cable curl	Band curls
Tricep	Dumbbell kickback	Cable pressdown	Band Tricep extensions
Abdomen	Crunches with weight	Seated “ab” machine	Seated crunches
Quadriceps	Squat	Leg extension	Body weight sit and stand
Hamstrings	Deadlift	Leg curl	Hip-up

\*Soup cans, weights, water bottles, resistance bands

# Where to start: A practical approach

- Resources as a practitioner
  - In-house
  - Community
  - Patient's personal supply/access
  - Handout with recommendations
- Considerations when devising plan:
  - Individual
    - Self-determination theory: competence, autonomy, relatedness
    - People should feel competent, a choice in the plan, there is a benefit to them, and ability to develop social support around plan
    - “Exercise as Medicine” but this medicine should be taken as group therapy

# Variables at Your Disposal

Exercise Variety:

Progression: Sitting / Standing / Single Leg w/ assistance / Single leg w/o assistance

Applicability to QOL: How does this transfer to their daily routine (can it help them reach an object that was previously out of their capability?)

Volume: Start small; Work to a Goal;

# Integrative RT Approach: Phase One

## The Journey to 100 Begins

1. Touch 3 different walls in a room 1-3 sets with 1 minute rest
2. Seated overhead press 1-3 sets of 15 (rest as needed)
3. Standing reach and rotate 1-3 sets of 15 (rest as needed)
4. Seated single arm rows 1-3 sets of 15 (rest as needed)
5. Standing step overs (1-3") 1-3 sets of 15 (rest as needed)
6. Seated leg extensions 1-3 sets of 15 (rest as needed)
7. Standing pick up (at waist) and lift overhead 1-3 sets of 15

Things to consider: Be FLEXIBLE; Leave Feeling Accomplished; Be Excited to Return

# Integrative RT Approach: Phase 1

## The Journey to 100 Continues

1. Touch 3 different walls + 3 Wall Push Ups 2-3 sets with 1 minute rest
2. Standing overhead press 2-3 sets of 25 (rest as needed)
3. Standing reach and rotate 2-3 sets of 25 (rest as needed)
4. Standing single arm rows 2-3 sets of 25 (rest as needed)
5. Standing step overs (1-5") 2-3 sets of 25 (rest as needed)
6. Standing leg extensions with 2-arm assistance 2-3 sets of 25 (rest as needed)
7. Standing pick up (hip-thigh) and lift overhead 2-3 sets of 25

Things to Consider: Challenging ENOUGH; Improvement;

# Integrative RT Approach: Phase 3

## The Journey to 100!

1. Touch 4 different walls + 4 Wall Push Ups 2-3 sets 1 minute rest
2. Sit to stand overhead press 80-100x (rest as needed)
3. Standing reach and rotate 80-100x (rest as needed)
4. Split Stance Standing single arm rows 80-100x (rest as needed)
5. Multi-Directional Standing step overs (1-7") 80-100x (rest as needed)
6. Standing leg extensions with 1-arm assistance 80-100x (rest as needed)
7. Standing pick up (hip-knee) and lift overhead 80-100x

Things to Consider: CELEBRATE!; Name on the wall; T-shirt

# Conclusion

Once the patient knows that you care, they will care how much you know, and be more willing to trust you in the process

## 3 Outcomes

1. Competence
2. Confidence
3. Connection

Thank You

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