

Exercise and Physical Activity for All Ages: 2012 Research and ACSM/ADA Prediabetes and Diabetes Guidelines

Ralph La Forge, MSc

Duke University - Endocrine Division

Durham NC

rlaforge@nc.rr.com

Four-part Agenda

- Overview & Key Concepts
- Recent Important Clinical Exercise Trials
- ACSM/ADA Physical Activity Guidelines
- Practical Physical Activity Strategies

Overview & Key Concepts

Objective

- Just get your patients to move and move often !

You too !!

REFERENCES

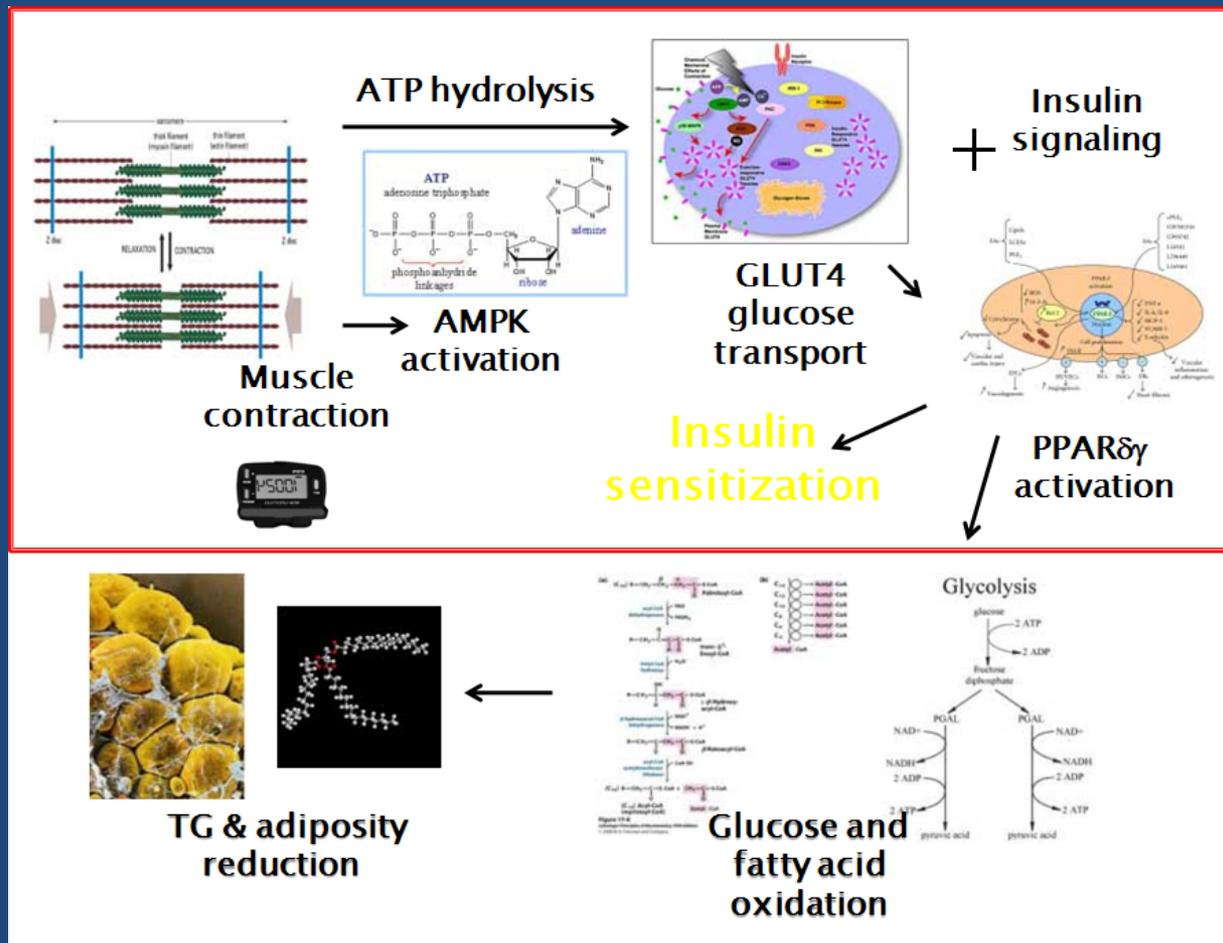
- Goodpaster 2003
- Hawley 2004
- Hoomard 2004
- Helmrich 1991
- Kraus 2004
- Ross 2004
- Laakosen 2005
- Schulze 2005
- LaForge 2006
- Short 2003
- Thyfault 2009
- Slentz 2011
- Chae 2012
- Sluik 2012

A large amount of evidence shows that exercise provides the best prevention and treatment for insulin resistance and type 2 diabetes

Weekly Physical Activity and Cardiometabolic Benefits

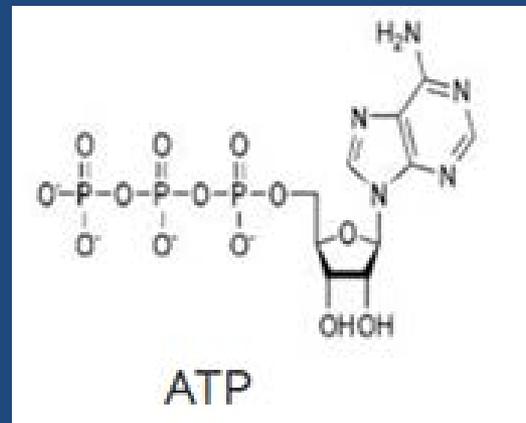
Walking	~5 miles	~10 miles	~15 miles	~20 miles	25+ miles
kcal per week	500	1000	1500	2000	2500+
Benefit	Functional and metabolic benefits (glucose transport, AMPK, PPAR _{gamma} , insulin sensitization)		Measurable body fat alterations, weight loss, lowered LDL-C, ...		Weight Loss Maintenance

Sequence of Metabolic Events During One Muscle Contraction



Bioenergetics of Moderate and High Intensity Exercise

	High Intensity Exercise	Low-Moderate Intensity Exercise
ATP Hydrolysis Rate	Very High ($>60\%$ V_{O2max})	Low (30 to 50% V_{O2max})
Exercise	15 minutes 300 kcal 43 moles ATP	30 to 35 minutes 300 kcal 43 moles ATP



Cardiometabolic Risk and Exercise Training

- From a reduction in cardiometabolic risk perspective - total energy expenditure is the key prescriptive parameter:
 - Fundamentally a product of exercise intensity x exercise duration.
- There are added benefits of higher intensity exercise but with added risks.

Comparative Outcome Indicators

Body Weight Changes vs. Muscle Contractions

BODY WEIGHT

- (fat, water, muscle protein)
loosely tied to adipokine,
A1C, lipocentric changes

MUSCLE CONTRACTIONS

- Each intentional
contraction/step: AMPK -
PPAR δ γ activation, insulin
sensitization

Adiposity Reduction (total body fat) vs. Weight Reduction

- Recording the actual behavior of muscle contraction, e.g., walking, is a more directly linked to insulin sensitization and other cardiometabolic risk reduction mechanisms (compared with assessing only body weight changes)
- Body weight changes do not entirely tell the story of fat weight changes (adiposity vs. body weight)
- Total physical activity energy expenditure is the most important cardiometabolic risk reduction parameter

How Much Physical Activity?

CMR Reduction	Weekly EE	Weight Loss
Diabetes	≥ 1000 kcal	≥2000 kcal
Prediabetes & Metabolic syndrome	≥ 1000 kcal	≥2000 kcal
Pediatric	7 hrs, 12,000+ steps	

Just move
and Move Often!

Recent Important Clinical Exercise Trials

Publications and
Research Trials 2011-2012

Exercise Dose and Insulin Sensitivity: Relevance for Diabetes Prevention

- Medicine and Science in Sports and Exercise 2012;44: 793–799
- 55 healthy volunteers (BMI 30.5) participated in a 16 week supervised endurance exercise intervention.
- Improved insulin sensitivity was significantly related to exercise dose in a graded dose–response relationship. No evidence of threshold or maximal dose–response effect was observed.
- Even an exercise dose of ~400 kcal per week (about 40%–50% of the guidelines for physical activity) was associated with a significant improvement in insulin sensitivity.

Dube', J. J., K. F. Allison, V. Rousson, B. H. Goodpaster, and F. Amati

Modest levels of physical activity are associated with a lower incidence of diabetes in a population with a high rate of obesity: The Strong Heart Family Study

Diabetes Care 2012;35:1743-1745.

- Cardiometabolic benefits do not appear to be limited to only the most active individuals; cardiometabolic health benefits may be achieved by adding as little as 2,500 steps (~1.3 miles walking) per day to baseline activity.

Fretts, A.M., B.V. Howard, B. McKnight, G.E. Duncan, S.A.A. Beresford, D. Calhoun, A.M. Kriska, K.L. Storth, D.S. Siscovick

Impact of exercise intensity and duration on insulin sensitivity in women with T2D

Segerström AB et.al. Eur J Intern Med.2010 Oct;21(5):404-8.
Sweden

- **METHODS:** 22 women with T2D participated in a supervised group exercise program for six months. The program combined endurance and resistance exercise.
 - Improvement in insulin sensitivity after six months is related to exercise intensity,
 - The reduction in HbA1c is related mainly to training volume (total kcal expenditure).
 - Metabolic effects of training may be seen in the absence of improved exercise capacity.

Key Point

- Most of the metabolic benefits of physical activity particularly for those with diabetes and prediabetes are generated by the **total energy expenditure** of the exercise session as compared to the mode or intensity of exercise.

Effects of intensity and volume on insulin sensitivity during acute bouts of resistance training

Black LE et.al. J Strength Cond Res.2010 Apr;24(4):1109-16. ASU

- 17 adults with IFG completed four separate bouts of resistance exercise under moderate intensity (65% 1RMax) or high intensity (85% 1RM) conditions within the confines of single set and multiple set protocols.
- High-intensity protocols resulted in greater insulin sensitivity (0.83 multiple set; 0.53 single set) as compared with moderate-intensity protocols. The high-intensity, multiple set bout yielded the greatest effect in both fasting glucose (0.61) and insulin sensitivity (0.83).

Both resistance- and endurance-type exercise reduce the prevalence of hyperglycemia in individuals with impaired glucose tolerance and in insulin-treated and non-insulin-treated type 2 diabetic patients

van Dijk J.W, et.al. Diabetologia 2012;55:1273-82

- 15 pts with IGT and 15 pts with T2D
- EndEx: 45 min cycling at 50% Wmax or
- ResEx: 45 min of lat pulls, chest press, leg press and extensions
- 3-5 sets of 10 reps at 55-75% of 1RMax
- A single session of EndEx or ResEx substantially reduces the prevalence of hyperglycemia and improves glycemic control during the subsequent 24 h period in individuals with IGT, and in insulin-treated and non-insulin-treated type 2 diabetic patients.

Daily Step Target to Measure Adherence to Physical Activity Guidelines in Children

Colley, R.C., I. Janssen, M.S. Tremblay

- Goal: find step count for moderate to vigorous physical activity
- N= 1613, 6-19 years; number of valid days =9879
 - 12,000 steps per day – a target to determine whether children 6-19 years of age are meeting the current physical activity guidelines of 60 minutes of daily moderate to vigorous physical activity.

Accelerometer Steps per day Translation of Moderate to Vigorous Activity

Tudor-Locke C., et.al. Prev Med. 2011. Pennington Biomedical Research Center

- 2005-2006 NHANES. N= 3,523 ADULTS.
 - 30 minutes per day of MVPA: 7,900 steps per day for males 8,300 steps per day for females.
 - In a subsample of participants (n=1,197) we found 150 minutes per week of MVPA translated to ~ 7,000 steps per day (or 49,000 steps per week).
 - Accumulating ~ 8,000 steps per day is a good proxy for 30 minutes of daily MVPA, while accumulating 7,000 steps per day every day is consistent with obtaining 150 minutes of weekly MVPA.

Energy Balance and its Components: Implications for Body Weight Regulation

Hall, K.D., S.B. Heymsfield, J.W. Kemnitz, S. Klein, D.A. Schoeller, J.R. Speakman, American Journal of Clinical Nutrition 2012;95:989–94

- A popular belief is that exercise training results in body composition changes that generate an additional energy benefit mediated through Resting Energy Expenditure (REE) Measurements that are not so confounded suggest that the impact of exercise training on REE is negligible.
- The origin of the “3500 kcal per pound” rule is based on the calculated energy content of body weight change and is often misapplied to predict the weight-change time course after a given intervention. This is a fundamental error because no time period is specified for that intervention.

Why do Individuals not Lose More Weight from an Exercise Intervention at a Defined Dose?

- Thomas, D.M., et.al., Obesity Reviews 2012; June 11
- Review of 15 controlled studies
- We conclude that the small magnitude of weight loss observed from the majority of evaluated exercise intervention studies is primarily due to low doses of prescribed exercise energy expenditures compounded by a concomitant increase in caloric intake (i.e., energy compensation).

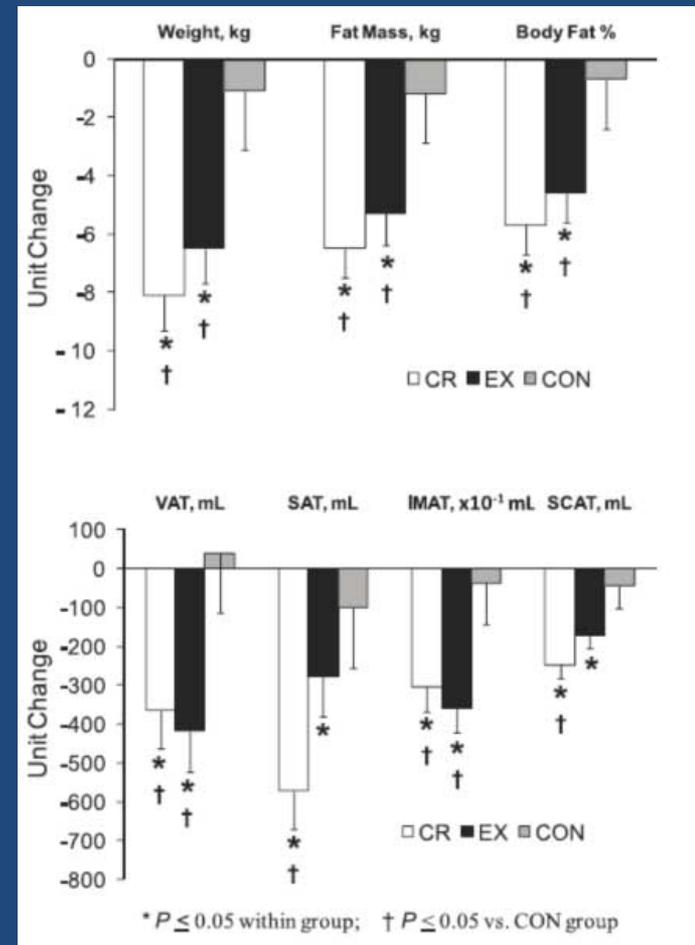
Why do Individuals not Lose More Weight from an Exercise Intervention at a Defined Dose? (cont.)

- These results indicate that RMR is reduced when exercise is increased and energy intake is held constant, particularly among individuals with lower levels of muscle mass and hence lower RMR.
- This metabolic adaptation reduces the size of the exercise-induced energy deficit and preserves body mass, primarily for leaner individuals.

Preferential Reductions in Intermuscular and Visceral Adipose Tissue with Exercise-induced Weight Loss Compared with Caloric Restriction

Murphy, J., et.al. Journal of Applied Physiology 112:79-85, 2012

- One year of exercise-induced weight loss results in greater reductions in Intermuscular and Visceral Adipose Tissue than comparable weight loss induced by CR alone.



Sedentary Time and Metabolic Syndrome

Bankoski, A., Sedentary Activity Associated With Metabolic Syndrome Independent of Physical Activity Diabetes Care, February 1, 2011, 34:497-503, NIH and GMUSE

Sedentary Time, Breaks in Sedentary Time, and Metabolic Variables in People with Newly Diagnosed Type 2 Diabetes

Cooper, A.R., et.al. Diabetologia 2012;55:589

- 528 adults (30–80 years) with newly diagnosed type 2 diabetes, who were in a diet and physical activity intervention. UK
- Results: In cross-sectional analyses each hour of sedentary time was associated with larger waist circumference of 1.89 cm; $p < 0.001$, higher insulin of 8.22 pmol per l ($p .003$) and HOMA-IR 0.42 ($p .004$), and lower HDL-C–0.04 mmol per l ($p .005$).
- Conclusions and interpretation: Higher sedentary time is associated with a poorer- metabolic profile in people with type 2 diabetes

Breaks in Sedentary Time Beneficial associations with metabolic risk

Genevieve Healy, Diabetes Care, Feb. 2011 Aust.

- N=168 men and women
- Accelerometry study
- Findings: The greater the number of breaks taken from sedentary behavior, the lower the waist circumference, body mass index, as well as blood lipids and glucose tolerance.
 - This was true even if the total amount of sedentary time and physical activity time were equal between individuals – the one who took breaks more frequently during their time at the office or while watching television was less obese and had better metabolic health.
 - Importantly, the breaks taken by the individuals in this study were of a brief duration (<5 min) and a low intensity (such as walking to the washroom, or simply standing).

So, what did we learn from these recent trials?

- Moderate levels of physical activity by any measure can reduce T2D risk and increase insulin sensitivity.
- Higher intensity exercise generates somewhat greater insulin sensitization than moderate intensity exercise – but it can be risky.
- Step target for MVPA for all kids: 12,000 per day.
- 8,000 steps per day is a good proxy for 30 min of MVPA for adults.
- From a practical point of view the benefit of acute exercise on REE is negligible.
- Aerobic exercise training may in fact reduce RMR when energy intake is held constant or unchanged.

Recent Trial Summary (cont.)

- It appears that exercise intensity is more related to insulin sensitization whereas total exercise volume (total daily EE) is related to HbA1C
- A single 45-min dose of exercise (AE or RT) can decrease hyperglycemia ~30-35% for 24 hours
- The addition of exercise training to dietary weight loss preferentially reduces subcutaneous abdominal adipocyte size, reduces IMAT and visceral fat
- Sedentary time can significantly increase waist circumference, decrease insulin sensitivity and HDL-cholesterol. This trend can be reversed by taking regular work breaks, e.g., 5 min walking on the hour.

ACSM/ADA Physical Activity Guidelines

Consensus Guidelines on PA

ADA Standards of Medical Care in Diabetes 2012

Diabetes Care, Volume 35, Supplement 1, January 2012 S11

- **Diabetes Physical Activity Guidelines**
 - **≥ 150 min per week of *moderate-intensity* aerobic physical activity (50–70% of maximum heart rate), spread over at least 3 days per week with no more than 2 consecutive days without exercise.**
 - **In the absence of contraindications, perform resistance training at least twice per week (at least one set of at least 5 different exercises).**

Cardiometabolic Risk Reduction Versus Weight Loss

Public Health vs. Weight Loss Physical Activity Recommendations

Public Health:

- 150 minutes per week = 30 minutes per day x 5 days per week
 - ~1000 to 1,500 kcal per week (20 to 30K+ steps per week)

Weight Loss:

- 250-300 minutes per week = ≥ 60 minutes per day x 5 or more days per week
 - ~2,000 to 3,000 kcal per week (40 to 60K+ steps per week)

ACSM-AHA Public Health Guidelines 2007

ACSM Exercise Weight Loss Statement 2009

Resistance Training & Weight Loss

- Resistance training (e.g., free weights or machines) will not promote clinically significant weight loss. Evidence category A.
- Resistance training was not assigned a major role by the authors because it was believed that evidence for the efficacy of weight training for weight loss and maintenance was insufficient.
- Although the energy expenditure associated with resistance training is not large, resistance training may increase muscle mass which may in turn increase 24-h energy expenditure.

ACSM Weight Loss Guidelines 2009 (Donnelly)

“The modern world makes it very easy to out-eat exercise, and nearly impossible to out-exercise excessive eating.”

David Katz
Yale University Prevention Research Center

Time Required to...

- Eat one scone = 5 to 10 minutes
 - Calories consumed: 140 to 500
- Work off those calories = 25 to 90 minutes
 - Effort required: 1.4 to 5 mile walk

ACSM/ADA Joint Position

“Although physical activity (PA) is a key element in the prevention and management of type 2 diabetes, many with this chronic disease do not become or remain regularly active. High-quality studies establishing the importance of exercise and fitness in diabetes were lacking until recently, but it is now well established that participation in regular PA improves blood glucose control and can prevent or delay type 2 diabetes, along with positively affecting lipids, blood pressure, cardiovascular events, mortality, and quality of life.”

Diabetes Care 33e:147, 2010

ACSM/ADA Joint Position (cont.)

“Structured interventions combining PA and modest weight loss have been shown to lower type 2 diabetes risk by up to 58% in high-risk populations. Most benefits of PA on diabetes management are realized through acute and chronic improvements in insulin action, accomplished with both aerobic and resistance training. The benefits of physical training are discussed, along with recommendations for varying activities, PA-associated blood glucose management, diabetes prevention, gestational diabetes mellitus, and safe and effective practices for PA with diabetes-related complications.”

-ACSM/ADA 2010

Diet vs. Exercise for Weight Loss

In randomized control trials, about one hour of daily moderate aerobic exercise produces at least as much fat loss as equivalent caloric restriction, with resultant greater insulin action.

Ross 2000, 2004
ACSM/ADA 2011

The optimal volume of exercise to achieve sustained major weight loss is probably much larger than the amount required to achieve improved blood glucose control and CV health.

ACSM/ADA 2011

Evidence Statement

A combination of aerobic and resistance exercise training may be more effective in improving BG control than either alone; however, more studies are needed to determine if total caloric expenditure, exercise duration, or exercise mode is responsible.

Supervision of Training

- Exercise intervention studies showing the greatest effect on blood glucose control have all involved supervision of exercise sessions by qualified exercise trainers.
- The most direct test of the incremental benefits of supervised training was the Italian Diabetes and Exercise Study.

Evidence Statement

- In addition to aerobic training, persons with type 2 diabetes should undertake moderate to vigorous resistance training at least two to three days per week.

Exercise Responses

- Those prescribing exercise are required to understand that those with T2D for more than five to eight years tend to exhibit these exercise responses:
 - Chronotropic incompetence (lowered heart rate)
 - Blunted systolic blood pressure response
 - Attenuated $\dot{V}\cdot O_2$ kinetics (aerobic capacity)
 - Anhydrosis (inadequate sweat response)
- Monitor the signs and symptoms of hypoglycemia.
- Rating Perceived Exertion should also be used to assess exercise intensity.

-ACSM/ADA 2010

Pediatric Diabetes Guidelines

Aerobic, Muscle-strengthening, and Bone-strengthening Activities

Every day children and adolescents should do 1 hour or more of physical activity.

Aerobic activities. Most of the 1 hour a day should be either moderate or vigorous intensity aerobic physical activity, and include vigorous-intensity physical activity at least 3 days a week.

As a part of the 1 hour a day of physical activity, the following should be included:

- Muscle-strengthening on at least 3 days a week. These activities make muscles do more work than usual during daily life. They should involve a moderate to high level of effort and work the major muscle groups of the body: legs, hips, back, abdomen, chest, shoulders, and arms.
- Bone-strengthening on at least 3 days of the week. These activities produce a force on the bones that promotes bone growth and strength through impact with the ground.

Youth should be encouraged to engage in physical activities that are appropriate for their age, enjoyable, and offer variety.

No period of activity is too short to count toward the Guidelines. -CDC 2012

Aerobic Activities by Level of Intensity

–CDC 2012

Type	Children	Adolescents
Vigorous– Intensity	<ul style="list-style-type: none"> • Active games involving running and chasing, such as tag • Bicycle riding* • Jumping rope • Martial arts, such as karate • Running • Sports such as ice or field hockey, basketball, swimming, tennis or gymnastics • Cross-country skiing 	<ul style="list-style-type: none"> • Active games involving running and chasing, such as flag football • Bicycle riding* • Jumping rope • Martial arts such as karate • Running • Sports such as tennis, ice or field hockey, basketball, swimming, soccer • Vigorous dancing • Aerobics
Muscle- Strengthening	<ul style="list-style-type: none"> • Games such as tug of war • Modified push-ups (with knees on the floor) • Resistance exercises using body weight or resistance bands • Rope or tree climbing • Sit-ups (curl-ups or crunches) • Swinging on playground equipment/bars 	<ul style="list-style-type: none"> • Cross-country skiing • Games such as tug of war • Push-ups • Resistance exercises with exercise bands, weight machines, hand-held weights • Climbing wall • Sit-ups (curl-ups or crunches)
Bone- Strengthening	<ul style="list-style-type: none"> • Games such as hop-scotch • Hopping, skipping, jumping • Jumping rope • Running • Sports such as gymnastics, basketball, volleyball, tennis 	<ul style="list-style-type: none"> • Hopping, skipping, jumping • Jumping rope • Running • Sports such as gymnastics, basketball, volleyball, tennis

Exercise in Children and Adolescents with Diabetes

- It is especially important to plan for long duration or intense aerobic exercise, or else hypoglycemia is almost inevitable. Nearly all forms of activity lasting > 30 minutes will be likely to require some adjustment to food and insulin.
- Young people with T1D have been found to have decreased aerobic capacity as measured by VO₂ max, compared to nondiabetic control subjects.

Pediatric Diabetes 2009;10 (Suppl.12) 1-2
International Society for Pediatric and Adolescent Diabetes

Hypoglycemia

- When regular (soluble) insulin has been injected prior to exercise, the most likely time for hypoglycemia will be 2-3h after injection.
- The high risk time after rapid-acting analog insulin is between 40 and 90 minutes.

-ISPAD 2009

Key Exercise Recommendations Pediatric T1D

- Avoid exercise if BG < 100 or > 300 mg per dL.
- Check ketones if BG > 250 and exercising.
- Take 15g of carbohydrates for every 30 min.
- Check BG every 30-60 min during exercise.
- Avoid using legs for injections e.g., running (increased absorption) – abdomen better.

Just get Your Patients to Move
and Move Often!

Practical Physical Activity Strategies

Practical Strategies to Getting Patients to Move

- Start by adding ~1000 kcal of physical activity per week.
- This is equivalent to ~9-10 miles per week of walking or ~ 20,000 pedometer steps.

What is ~1000 kcal of Physical Activity ?

- Assumes 150-170 lb body weight (heavier individuals expend more kcal)
- 10 miles of walking at ~3 mph *
- 2.5-3 hours of continuous exercise at ~55-65% of maximum effort level
- Three 45-50 minute aerobics classes
- 3-hour hike over variable terrain with 10 pound backpack
- 3 hours of cycling at 10-12 mph
- 3 sets of singles tennis
- 3 miles of freestyle swimming (women)
- 2.5 miles of free-style swimming (men)

* Note that you don't have to do the above activities all at once but spread out over the course of a week

100 kcal = ~ 1 mile per day of walking

- Over the last 50 years in the U.S. we estimate that daily occupation-related energy expenditure has decreased by more than 100 calories and this reduction in energy expenditure accounts for a significant portion of the increase in mean U.S. body weights for women and men.

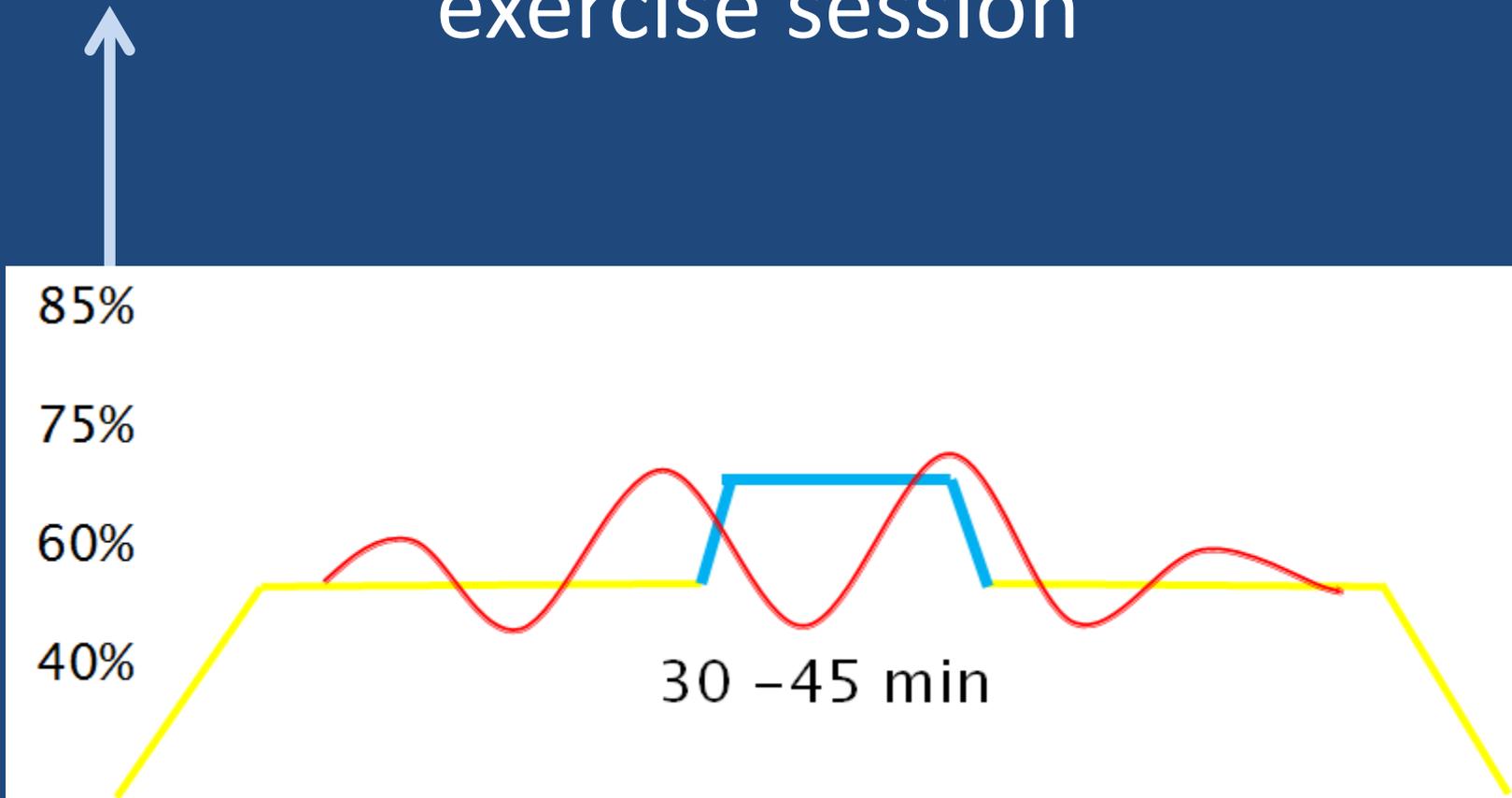
Church T et.al. 2011; PlosOne. Pennington Res. Inst.
(NHANES 2006)

Time-efficient 1600+ kcal Weekly Program

- Monday: 20-min walk (or 5 x 4 min at work)
- Wednesday: 20-min walk (or 5 x 4 min at work)
- Friday: 20-min walk (or 5 x 4 min at work)
- 1 weekend day: 2hr+ drop-off variable terrain walk-hike
- TOTAL EE: $400 + 1200 \text{ kcal} = 1600+ \text{ kcal} *$

* Add 10-25% kcal at BMI's > 34

Multi-intensity continuous aerobic exercise session



Weight Factor

- Overweight and obese prediabetes and diabetes patients expend more calories for a given walking workout than those who are normal weight



Weight Factor (cont.)

- Thus, even walking may represent a difficult exercise modality for obese individuals because they can use as much as 56% VO₂max (some at BMI's >40 using 64-98% VO₂max) to meet the demand of such an activity compared with only 35% in normal-weight subjects.

56% vs 35%

Mattsson E et.al. Int J Obes Relat Metab Disord. 1997;21:380–386.

Workplace EE

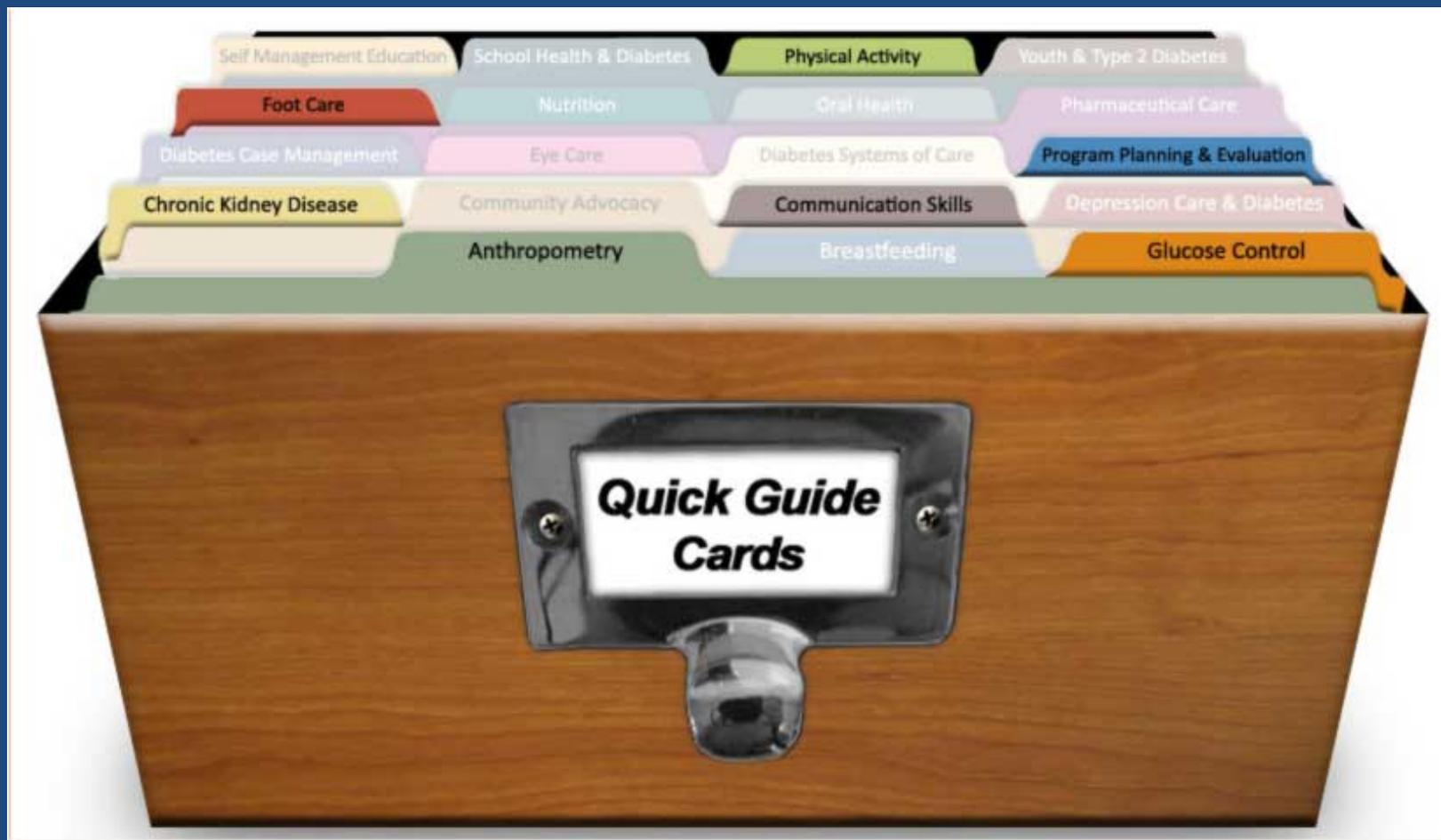
Feasibility of a Portable Pedal Exercise Machine for Reducing Sedentary Time in the Workplace:

- 5 min per hr X 7 hrs
- 35 min @ 3-4 kcal per min
- 2000-2500 steps
- 100 – 140 kcal (insulin sensitization – e.g., 10-15 mg metformin)

Systematic Pedometry

- Domestic or household circuit activity

<http://www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=toolsQuickGuides>



www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=toolsPAHowto

Physical Activity

Overview How To Other Resources EHR Documentation

Exercise Program Screening Exercise ECG Screening Exercise Equipment Resistance Training

Household Circuit Pedometer Instructions & Calibration Native Pedometer Trekking Youth Assessment

Exercise Program Screening

Why is this important?

- Regular exercise improves cardiometabolic health and reduces cardiovascular morbidity and mortality.
- Patients with or at high risk for CVD or diabetes have up to a ten-fold increase in cardiovascular events during exercise, compared to healthy persons.
- Patients with CVD should be identified by screening, evaluated and counseled before beginning a moderate to vigorous exercise program.

Action steps:

- Use one of the two screening instruments prior to recommending or starting an exercise program for your patients:
 - [AHA/ACSM Health and Fitness Facility Preparticipation Screening Questionnaire](#)

 [Best Practice](#) [PDF - 507KB]

 [Standards of Care](#) [PDF - 540KB]



00:00/

[Transcript \[PDF - 44KB\]](#)

Systematic Clinical Pedometry

- The application of the systematic use of well-engineered pedometers as objective activity outcomes measures in prediabetes and diabetes

Pediatric 7-Day Step Activity Assessment

Youth Stepcount Activity Log

Name: _____

Instructions:

- Wear the pedometer tightly on your waist (beltline) and directly over your right leg.
- Reset your pedometer to ZERO after each day
- Record your total stepcount for two full SCHOOL DAYS (e.g., 7 a.m. to bedtime)
- Record your total stepcount for two full WEEKEND DAYS (e.g., 7 a.m. to bedtime)

*If you play sports include the pedometer stepcount during that sport (when the pedometer can be worn with your athletic gear)

Return this log to the next Personal Fitness merit badge class

Total # of Steps

School day	
Date:	
School day	
Date:	
Weekend day	
Date:	
Weekend day	
Date:	
Comments:	



Walk Your Way to Health



Lancaster County

444 Cherrycreek Road, Suite A / Lincoln, NE 68528
(402) 441-7180 / <http://lancaster.unl.edu>

ABCs for Good Health

RECORD SHEET

Week	Instructions	Record Steps Taken Daily						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Week 1 Dates _____	Wear your pedometer every day. Record the number of steps you normally take on each day. Do not increase your walking in this first week. This will be used to calculate your baseline.							
Baseline (Average Daily Baseline Steps) To calculate your baseline, add the number of steps you took during week 1 and divide by 7. Week 1 Total Steps _____ ÷ 7 = _____ steps		After you have calculated your baseline steps, gradually increase your steps as recommended below for each week. Aim for the recommended number of steps for at least 3 or 5 days (as indicated below).						
Week 2 Dates _____	If baseline was: <2,500 steps 2,500-5,000 steps 5,000-7,500 steps >7,500 steps Aim for: 3,000 steps on at least 3 days 3,000-5,500 steps on 3 days 5,500-8,000 steps on 3 days 8,000-10,000 steps on 3 days							
Week 3 Dates _____	If baseline was: <2,500 steps 2,500-5,000 steps 5,000-7,500 steps >7,500 steps Aim for: 3,000 steps on at least 5 days 3,000-5,500 steps on 5 days 5,500-8,000 steps on 5 days 8,000-10,000 steps on 5 days							
Week 4 Dates _____	If baseline was: <2,500 steps 2,500-5,000 steps 5,000-7,500 steps >7,500 steps Aim for: 3,500 steps on at least 3 days 3,500-6,000 steps on 3 days 6,000-8,500 steps on 3 days 8,500-10,000 steps on 3 days							
Week 5 Dates _____	If baseline was: <2,500 steps 2,500-5,000 steps 5,000-7,500 steps >7,500 steps Aim for: 3,500 steps on at least 5 days 3,500-6,000 steps on 5 days 6,000-8,500 steps on 5 days 8,500-10,000 steps on 5 days							
Week 6 Dates _____	If baseline was: <2,500 steps 2,500-5,000 steps 5,000-7,500 steps >7,500 steps Aim for: 4,000 steps on at least 3 days 4,500-7,000 steps on 3 days 7,000-9,500 steps on 3 days 9,500-10,000 steps on 3 days							

Prescription Form – Exercise Pedometry

RX for Outpatient Exercise Pedometry

Patient name:

Date:

Therapeutic code:

Order for following patient physical activity pedometer:

|| Pedometer: Eagle 2720 pedometer

Rx: steps per day ____ steps per week per month /

Other Rx:

Patient instructions: See attached physical activity and pedometer guidelines

M.D.

Referring provider/physician

Pedometer Trekking

- Three to ten customized paths or trails of varying length and terrain (one to six miles) with known step count requirements.

IHS DDTP PTrekking Rx

Trekking Levels and Courses

- Level 1: 1000 – 3000 steps (.5-1.5 mile courses)
- Level 2: 3000 - 6000 steps (1.5 – 3 miles)
- Level 3: 6000 – 10,000 steps (3 - 5 miles)
- Level 4: >10,000 steps (>5 miles)

Level of difficulty: Easy (minimum terrain/grade), Moderate (moderate terrain/grade), Difficult (significant variable terrain and graded)

Trek Rx

- Ped Rx 1: 1 to 3K steps
- Ped Rx 2: 3 to 6K steps
- Ped Rx3: 6 to 10K steps
- Ped Rx 4: More than 10K steps

Daily Fit Log

- pec@pecentral.org

The screenshot shows the PE Central website interface. At the top, there is a navigation bar with links for Newsletter, Contact, Site Map, and Home. Below this is a search bar and a menu with categories like Kids Programs, Lessons, Assessment, Boards, Adapted, PreK, Active Gaming, Class Mngt, Media, Jobs, Prof, Shop, and Sites. A large green banner features the text "Daily Fit Log Fitness Technology" and "Get Your Students Moving!". Below the banner, there is a "Primary Sponsor" section for S&S DISCOUNT, which offers free equipment for publishing on PE Central. A "What's NEW" badge is also present. The main content area is titled "Submit a Lesson | Search Lessons" and contains a grid of 18 links for various lesson categories, including Classroom Mngt, Instant Activities, Preschool, Grades K-2, Grades 3-5, Grades 6-8, Grades 9-12, Health, Best Practice Ideas, Active Gaming, Integrated, Dance, Cooperative, Holiday, Pedometer, Field Day, Assessment, Activity Cues, College Professor Ideas, and Bulletin Boards.

PE CENTRAL
The Premier Web site for Health and Physical Education

Newsletter | Contact | Site Map | Home | SHARE

Google Custom Search Search | More

Kids Programs ▾ Lessons ▾ Assessment ▾ Boards ▾ Adapted ▾ PreK ▾ Active Gaming ▾ Class Mngt ▾ Media ▾ Jobs ▾ Prof ▾ Shop ▾ Sites ▾ + ▾

Daily Fit Log Get Your Students Moving!
Fitness Technology

S&S Sports Equipment
Call us at 1-800-243-9232
s5www.com

Primary Sponsor
S&S DISCOUNT
Free Equipment for Publishing on PE Central

Welcome to the premier site for health & physical education teachers, parents and students. Our goal is to provide the latest information about developmentally appropriate physical education programs for children. To motivate, we offer fun kids fitness programs such as [Lon It](#) and the [PEC Challenge](#). We have over 1800 published lesson ideas. We invite you to [share your ideas](#) which are reviewed by our [editorial team](#). Updated: 4-9-12

What's NEW

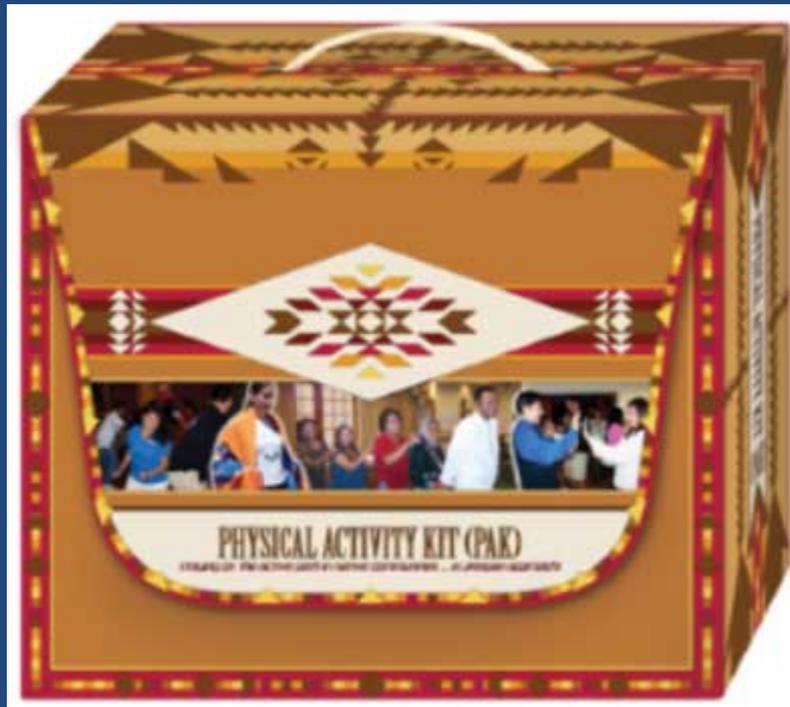
Equipment Specials
[Advertise on PEC](#)

[Submit a Lesson](#) | [Search Lessons](#)

- [Classroom Mngt](#)
- [Instant Activities](#)
- [Preschool](#)
- [Grades K-2](#)
- [Grades 3-5](#)
- [Grades 6-8](#)
- [Grades 9-12](#)
- [Health](#)
- [Best Practice Ideas](#)
- [Active Gaming](#)
- [Integrated](#)
- [Dance](#)
- [Cooperative](#)
- [Holiday](#)
- [Pedometer](#)
- [Field Day](#)
- [Assessment](#)
- [Activity Cues](#)
- [College Professor Ideas](#)
- [Bulletin Boards](#)

IHS Physical Activity Kit

www.ihs.gov/hpdp/index.cfm?module=dsp_hpdp_resources_physicalactivitykit



PAK Books

- Young People - Book #1
- Mt. Pathways Challenge - Book #2
- Modified American Indian Games - Book #3
- Exercise Breaks - Book #4
- Young Children - Book #5
- Adults and Family - Book #6
- Older Adults - Book #7
- Resources- Book #8

Are There Risk Reduction Differences?

- An active lifestyle expending more than 1500 kcal per week from a variety of domestic, recreational, and work-related activities
- An inactive work and recreational lifestyle but works out 3-5 days per week for 1500 kcal per week

Diverse Types of Moderate Exercise

- Diverse types of moderate exercise are also associated with lower incidence of diabetes and CVD mortality.
 - This includes such utilitarian activities as walking, gardening, climbing, and household/yard chores.
 - Those who expend 1000 - 1500 kcal per week in such utilitarian activities may require very little additional exercise to lower diabetes and CVD risk.

Lakka TA. Et.al. NEJM 1994;330:1549

Thompson P et.al. Circ. 2003;107:3101

Fransson E. et.al. Scan J Pub Health 2003;31:324

Meisinger C et.al. Diabetologia 2005;48:27

Marcus B et.al. Circ. 2006;114: 2739

Holme I et.al. BMC Public Health 2007, 7:154

Utilitarian-domestic Activities do Condition and Reduce Risk

- Yardwork
- Gardening
- Housework
- Painting, cleaning, shoveling, scrubbing, washing
- Repair work
- ADL's

You can't fool these labs!!

- Triglycerides and non HDL-C tell us more about the patient's lifestyle (and physical activity volume) than any other single laboratory measure.

Lifestyle Lab Panel

Primary:

- Triglycerides
- Non HDL-C
 - Non HDLC=TC-HDL
- Sys BP

Secondary:

- FPG &/or A1C
- Subscap SF
- Waist circumference

GXT's with ECG Prior To Exercise Programming

Diabetic patients who have been previously sedentary and who plan to regularly engage in moderate to vigorous exercise require a medical examination and graded exercise treadmill test with ECG (GXT) prior to participation.

- Moderate: 40-60% of V_{O2} max
- Vigorous: 60%+ of V_{O2} max (>75% HRmax)

ACSM 2009

Just get your patients to move
and move often!

You too !!

Questions?

Clinical Exercise Science Resources?

rlaforge@nc.rr.com