

# Physical Activity Counseling & Exercise Prescription in Diabetes Clinical Practice

*Capital Health Diabetes Education Conference*

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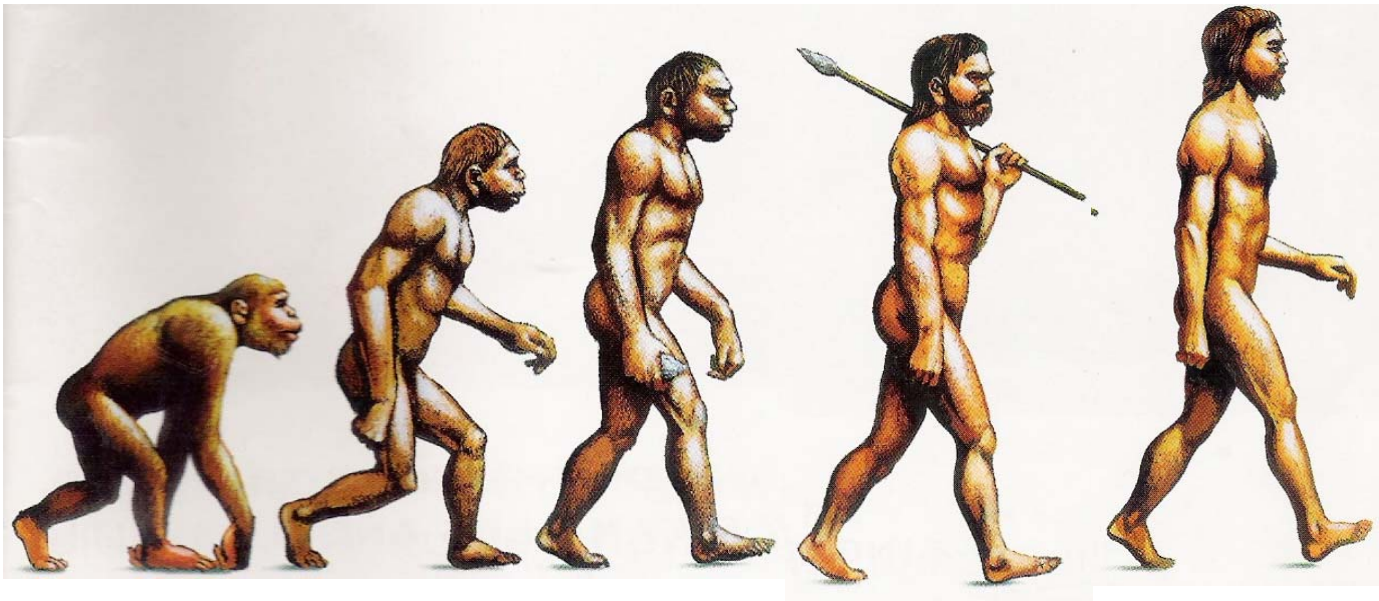
# Learning Objectives

- Why we need Physical Activity & Exercise
  - Important take home messages
- Addressing challenges for Physical Activity Counseling in routine clinical practice
  - Practical messages for your patients
- Important points on Exercise Prescription
  - Identifying challenges patients have in adopting an active lifestyle

# Why we need physical activity & exercise....

We are 'programmed' to consume food AND  
Our bodies were designed to MOVE!!...

Hunter gatherers & stationary farmers of yesteryear expended large amounts of energy



**But we are also programmed for efficiency...**

# Domains of Physical Activity

- Leisure time (reported)
  - (emphasis: sports and recreation)
  - 'Active' to very inactive
- Commuting or 'active' transportation
- Occupational
- Chores or Personal Care



# New PA Guidelines for Canadians

## Guidelines

- To achieve health benefits, adults aged 18-64 years should accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more.
- It is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week.
- More physical activity provides greater health benefits.

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[www.csep.ca/guidelines](http://www.csep.ca/guidelines)

Similar guidelines aged 65 years and older

# Measured Physical Activity in Canada

(Colley et al. 2011, Health Reports, CHMS 2007-2009)

Canadians reporting Mod-Vigorous PA = 52%

Canadians aged 20-79 **actually attaining PA criteria:**

- Average > 10,000 steps per day  
**35%**
- > 150 min MVPA / wk in bouts >10 min  
**15%** (i.e CSEP & CDA Guidelines)
- 30 min MVPA, in 10min bouts, 5 out of 7 days:  
**5%**

**Sedentary: ~10 h/day**, light PA ~2h/day, MVPA: 24 min

# The Obesity Epidemic

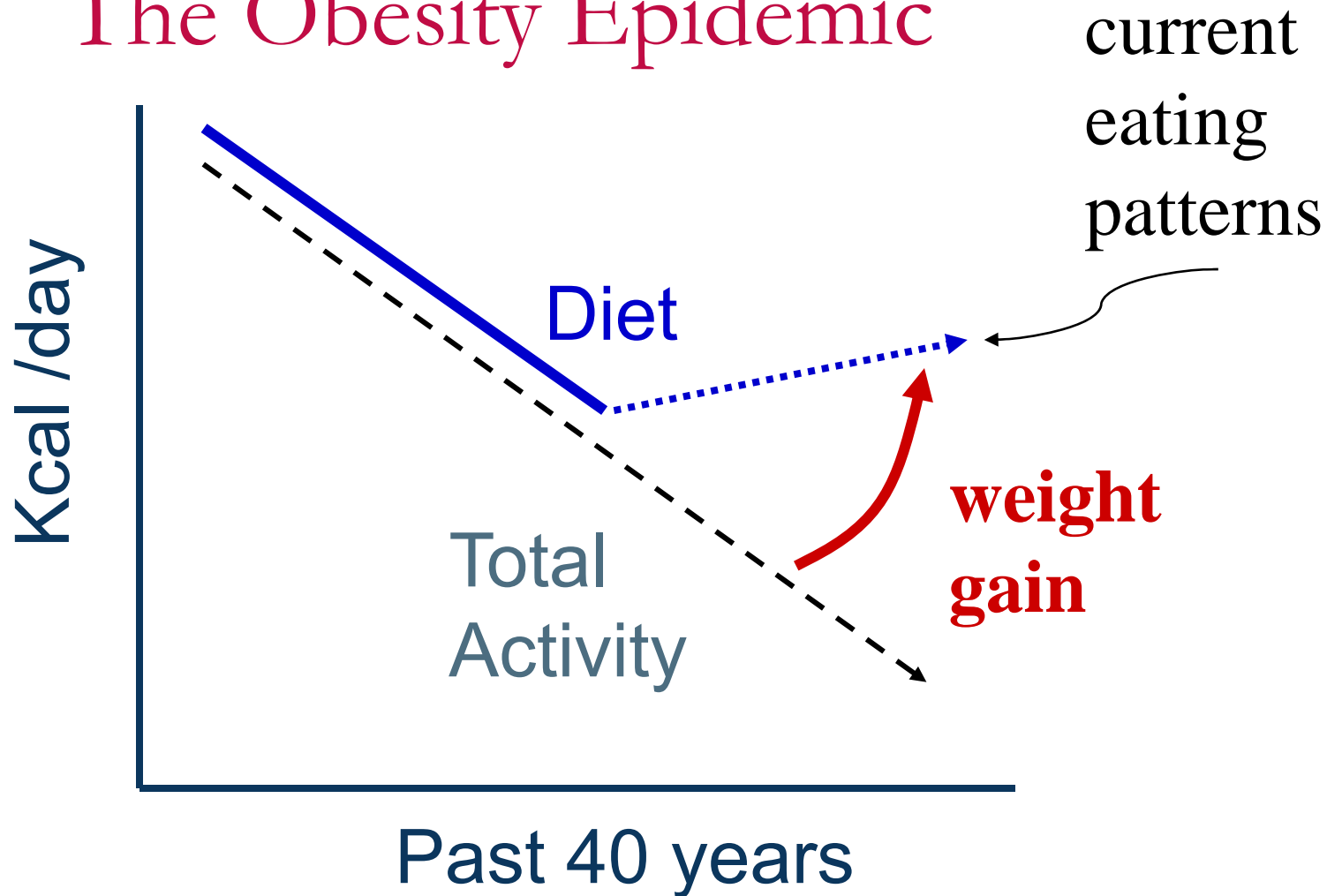


Fig 1

The 'average' N.A. adult gains 0.5-1 kg/year  
An imbalance of ~100 kcal/day (Hill & Wyatt, 2005)

(redrawn from Hill and Wyatt, JAP, 2005)

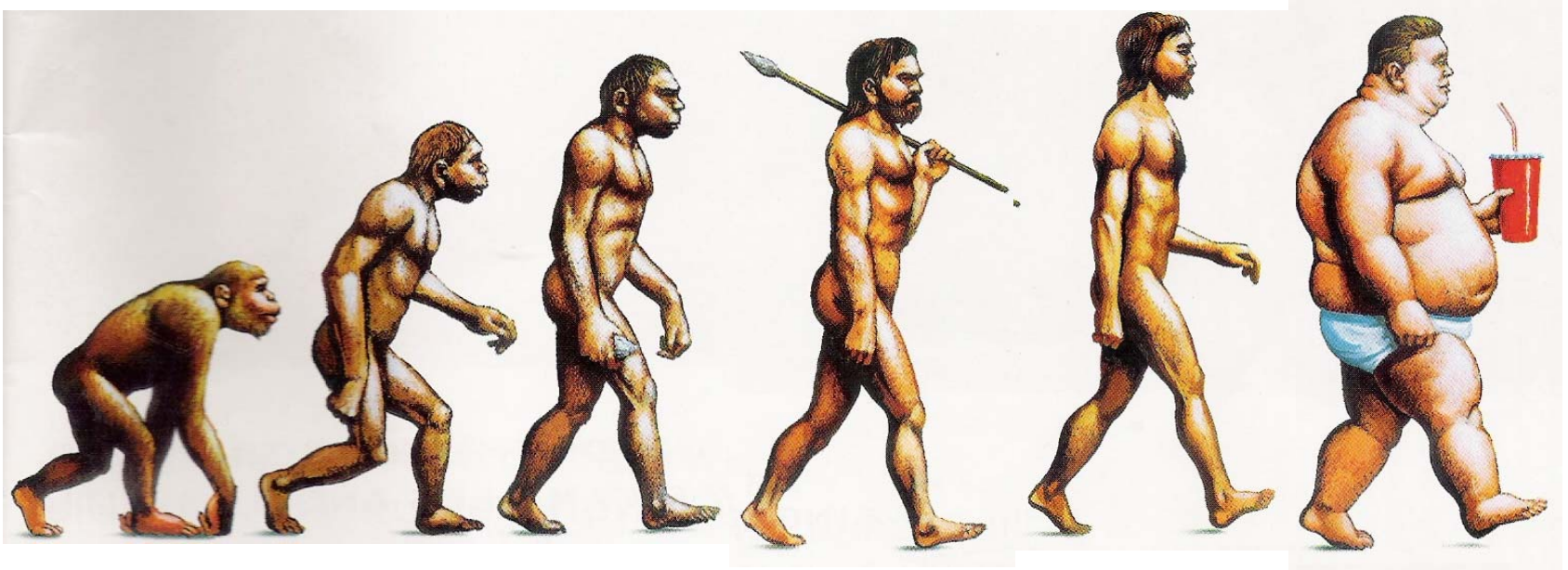


# Why we need physical activity & exercise....

Physical activity is a basic physiological NEED  
like breathing, eating and sleeping

Modern innovation creates

‘im-balance’ or “dis-ease”



**We are battling strong genetic programming to be healthy in today's society**

(adapted from the “The Shape of Things to Come”, Copyright© 2003 “The Economist”)

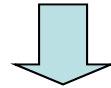


**Environment/  
Lifestyle  
Factors**

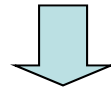


**Genetics**

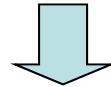
Energy Imbalance



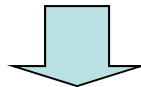
Abnormal muscle/adipose biology  
Excess adipose tissue  
Abdominal obesity



Insulin resistance  
Hyperinsulinemia



Dyslipidemia  
Dysglycemia



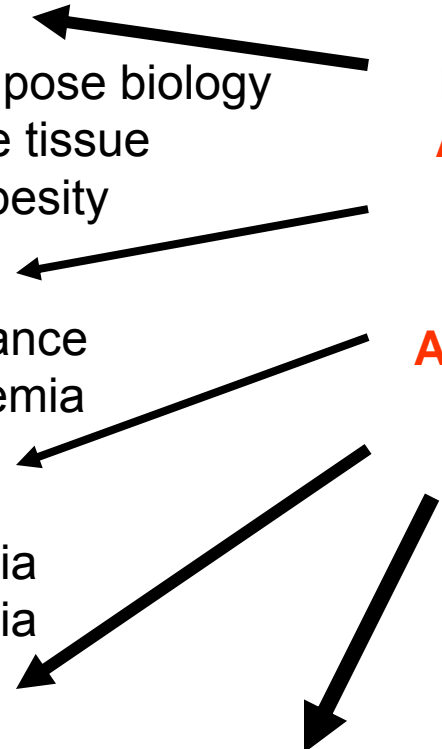
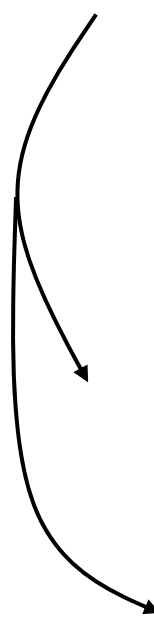
**DIABETES**  
Hypertension  
Hypercholesterolemia

Physical  
**INACTIVITY**  
**Accelerates**

Physical  
Activity  
**ATTENUATES**

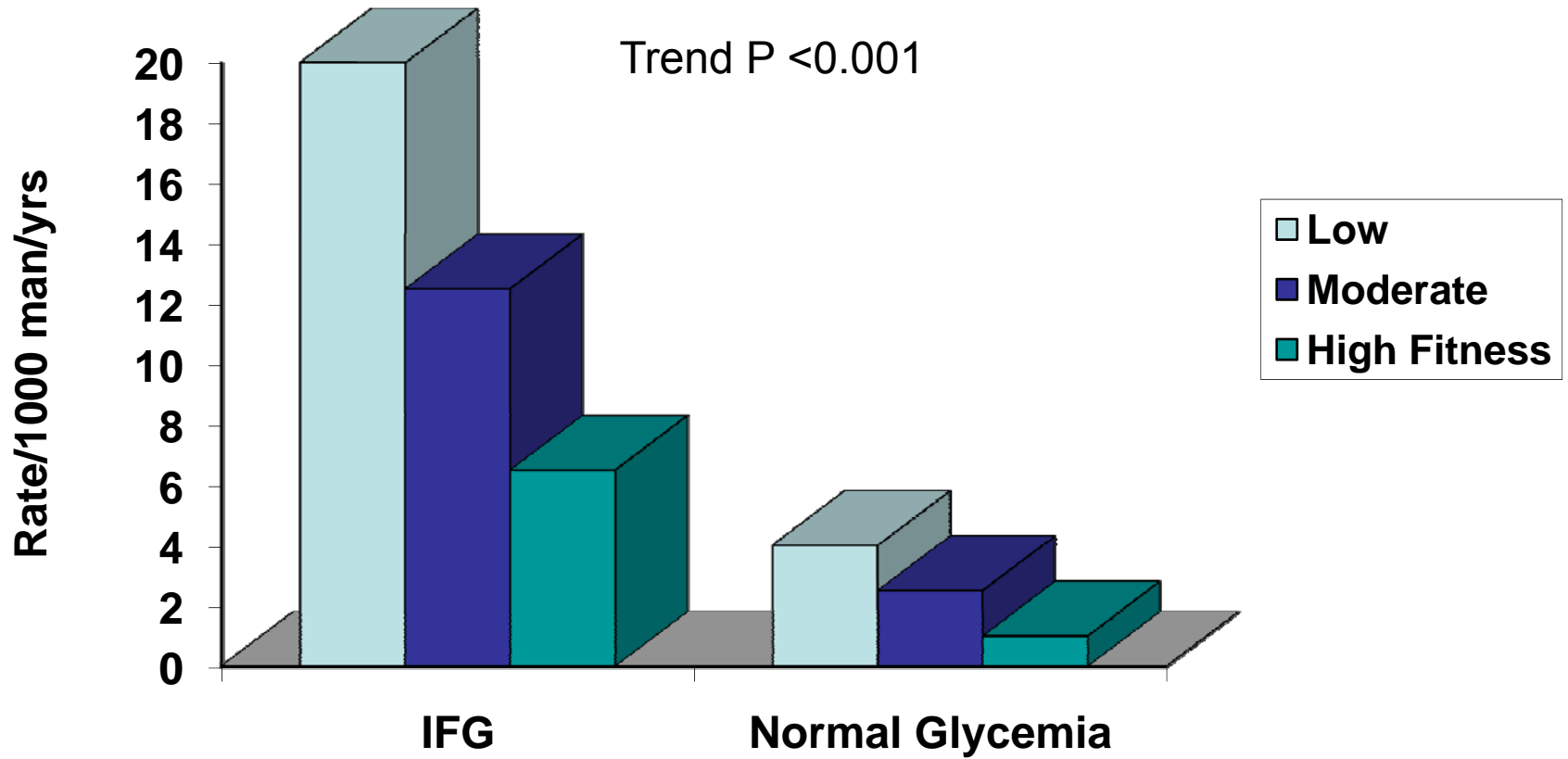
CHD &  
↑ Mortality

FFA  
Adipokines  
Inflammatory  
Molecules



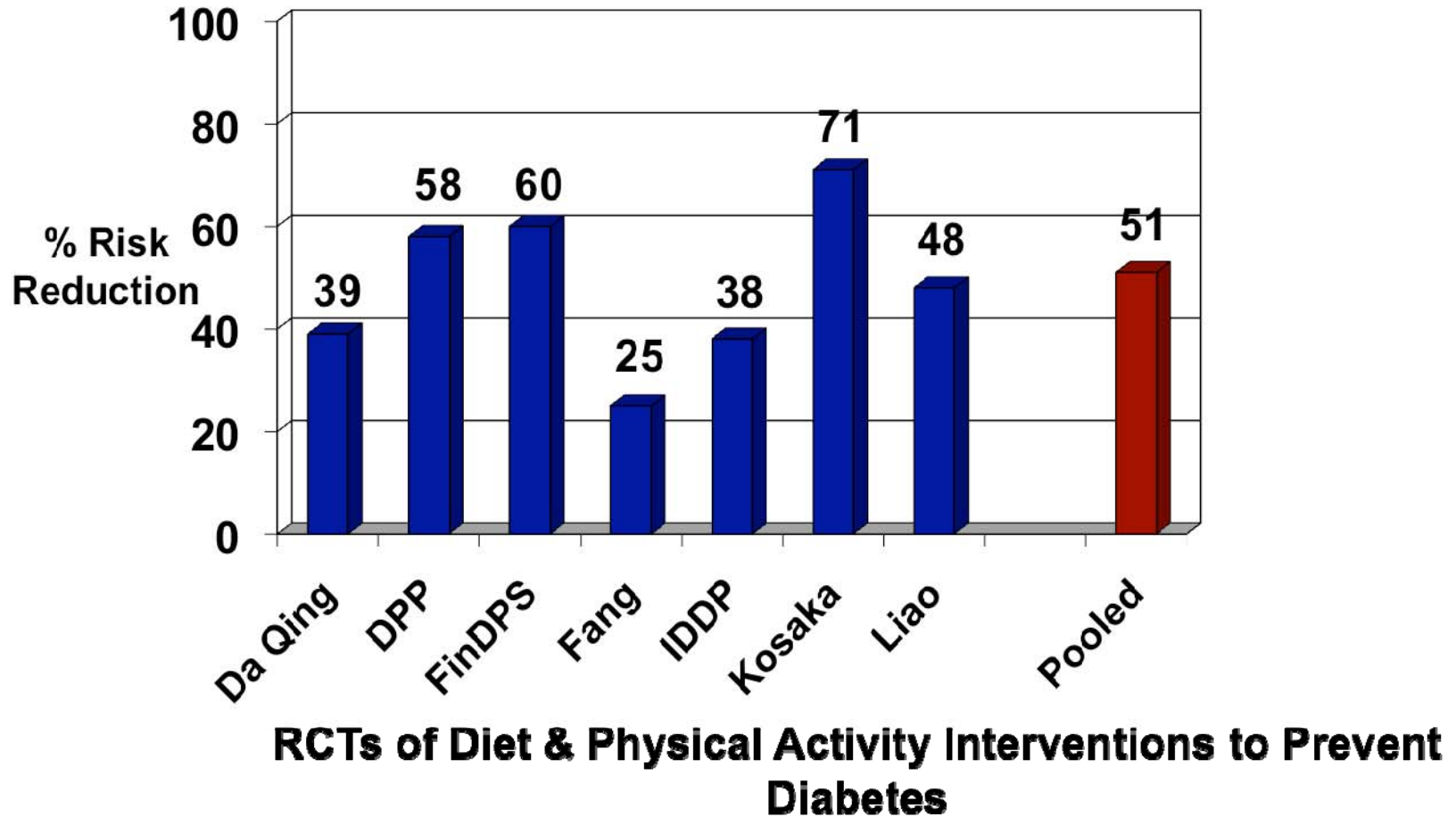
# Incident Diabetes by CR Fitness

Aerobics Centre Longitudinal Study (ACLS)



Adapted from Wei et al., Ann. Intern. Med. 1999  
8633 non-diabetic men, follow up 6 years

# Reduction in Type 2 Diabetes – Lifestyle Intervention Trials



\*Adapted from Gillies, C. L et al. BMJ 2007;334:299

# CDA 2008 PA Recommendations

- “People with diabetes should accumulate a minimum of 150 minutes of **moderate- to vigorous-intensity** aerobic exercise each week, spread over at least 3 days of the week, with no more than 2 consecutive days without exercise”
- “People with diabetes (including elderly people) should also be encouraged to perform resistance exercise 3 times per week **in addition** to aerobic exercise”
  - **Initial instruction** and periodic supervision by an exercise specialist are recommended.



# Who is meeting CDA Guidelines?

Patients **Pre-Test** (n=203) Fowles, Shields, et al., *in progress*

- Report Moderate Physical Activity  
38% ( $\geq 3x/week$ )
- Aerobic Exercise  
9.6% ( $\geq 3x/week$ ); 83% none
- Resistance Exercise  
9.6% ( $\geq 3x/week$ ); 83% none
- Both Aerobic **AND** Resistance Exercise  
2.4 % (both  $\geq 3x/week$ )

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The best exercise program in the  
world doesn't work,  
if nobody does it.

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Jonathon Fowles



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# Practical Message #1

- “First and foremost, regardless of the starting point, a regular pattern of activity should be advice given repeatedly by all members of the health-care team, including the primary physician.”

(Riddell & Fowles, Med. Post, 2010)

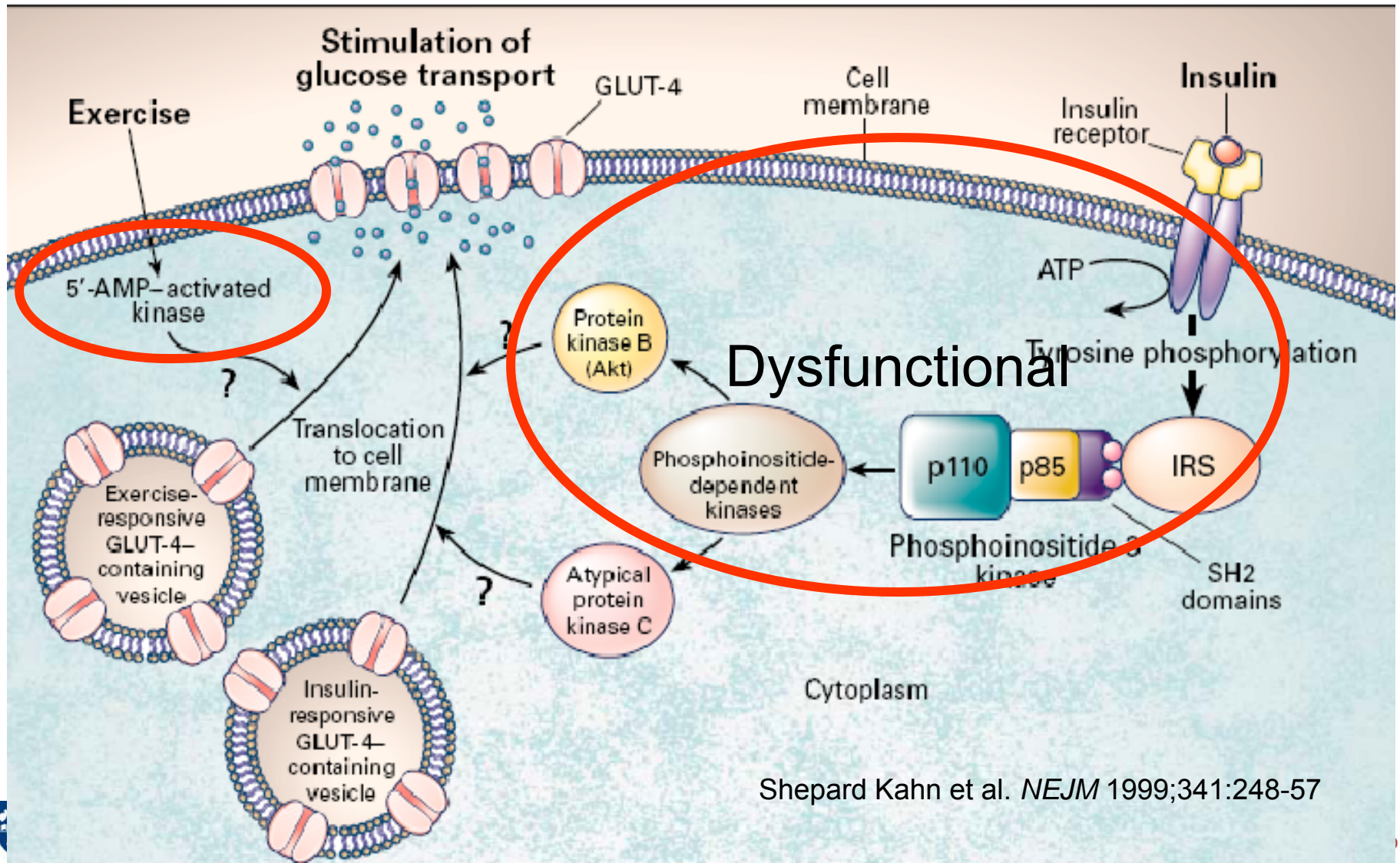
- Sedentary behavior is a key contributor to metabolic dysfunction and there is strong evidence to this link; however, physical activity is a message that is often lost in the time constraints of a busy medical visit.

# Would You Prescribe a Drug without Understanding How it Works or it's Dose-Response Characteristics?



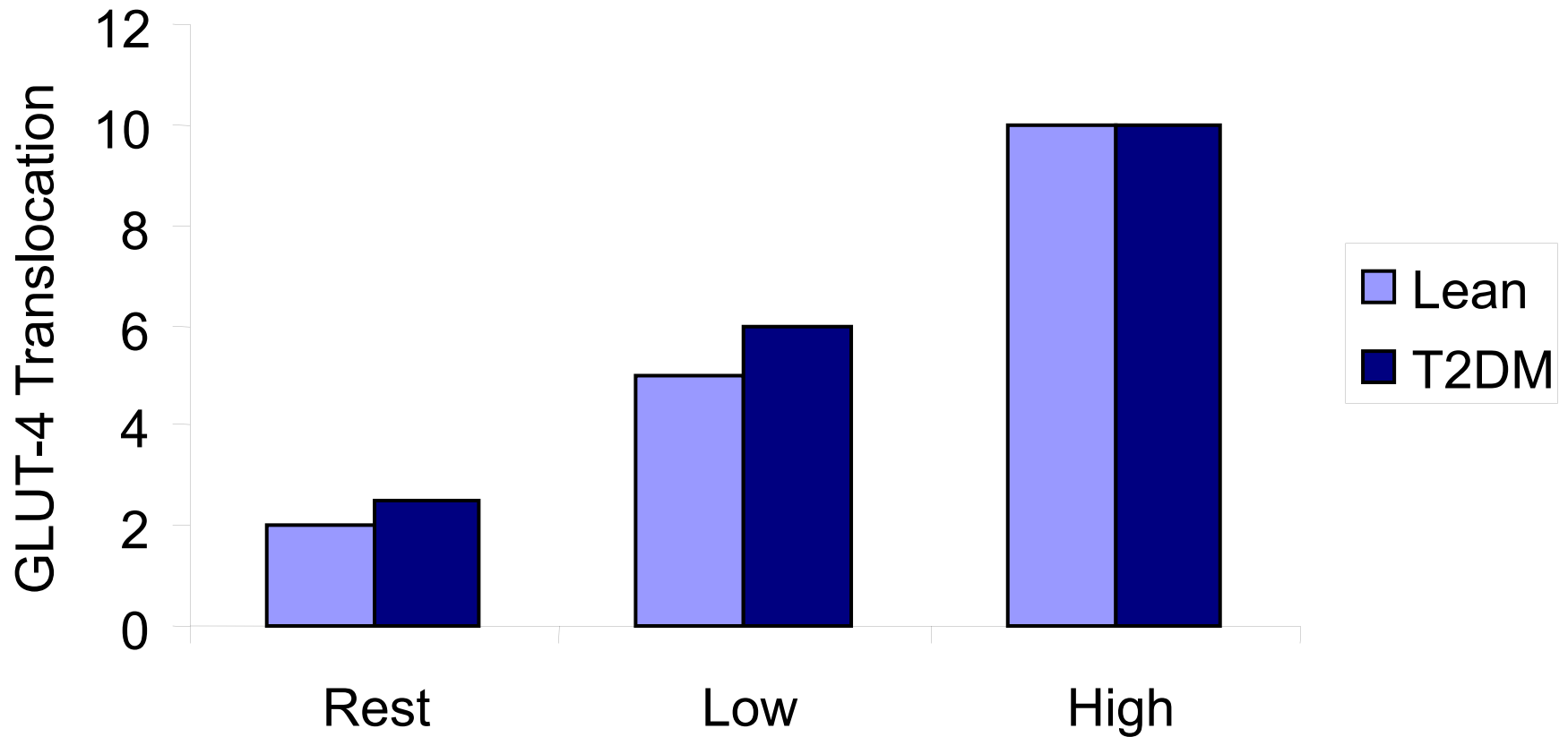
- Weight loss?
- Glucose uptake?
- Improved insulin action?

# Insulin Signaling in Type 2 Diabetes

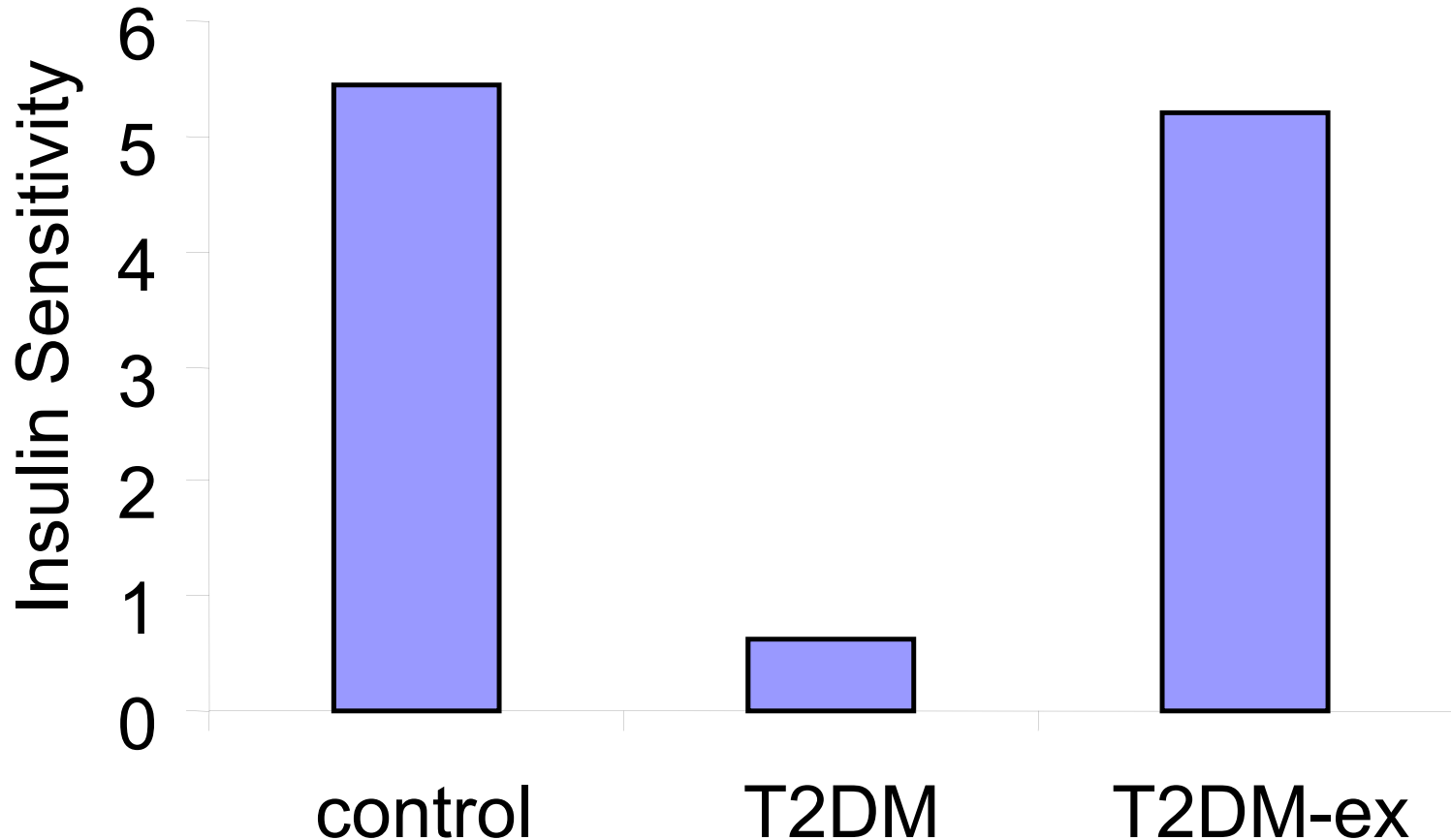


Shepard Kahn et al. *NEJM* 1999;341:248-57

# Role of Exercise

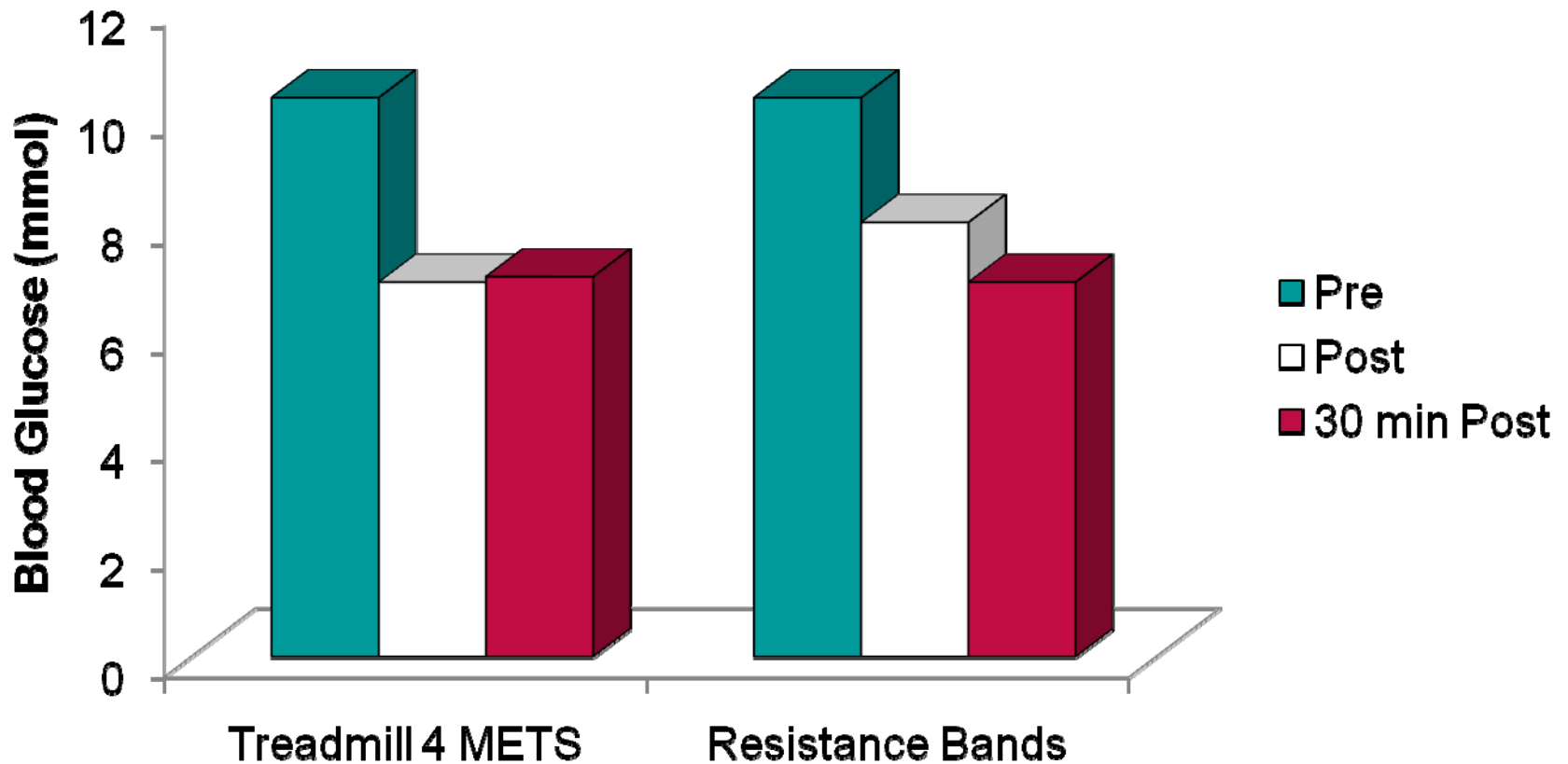


# Acute Exercise and Insulin Sensitivity



# Acute Changes in Blood Glucose

30 minutes of Exercise in Type 2 Diabetes Patients

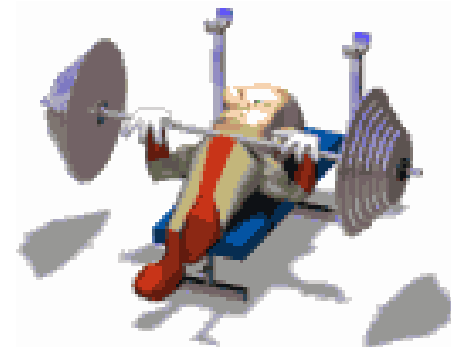




# Benefits of Exercise – Evidence

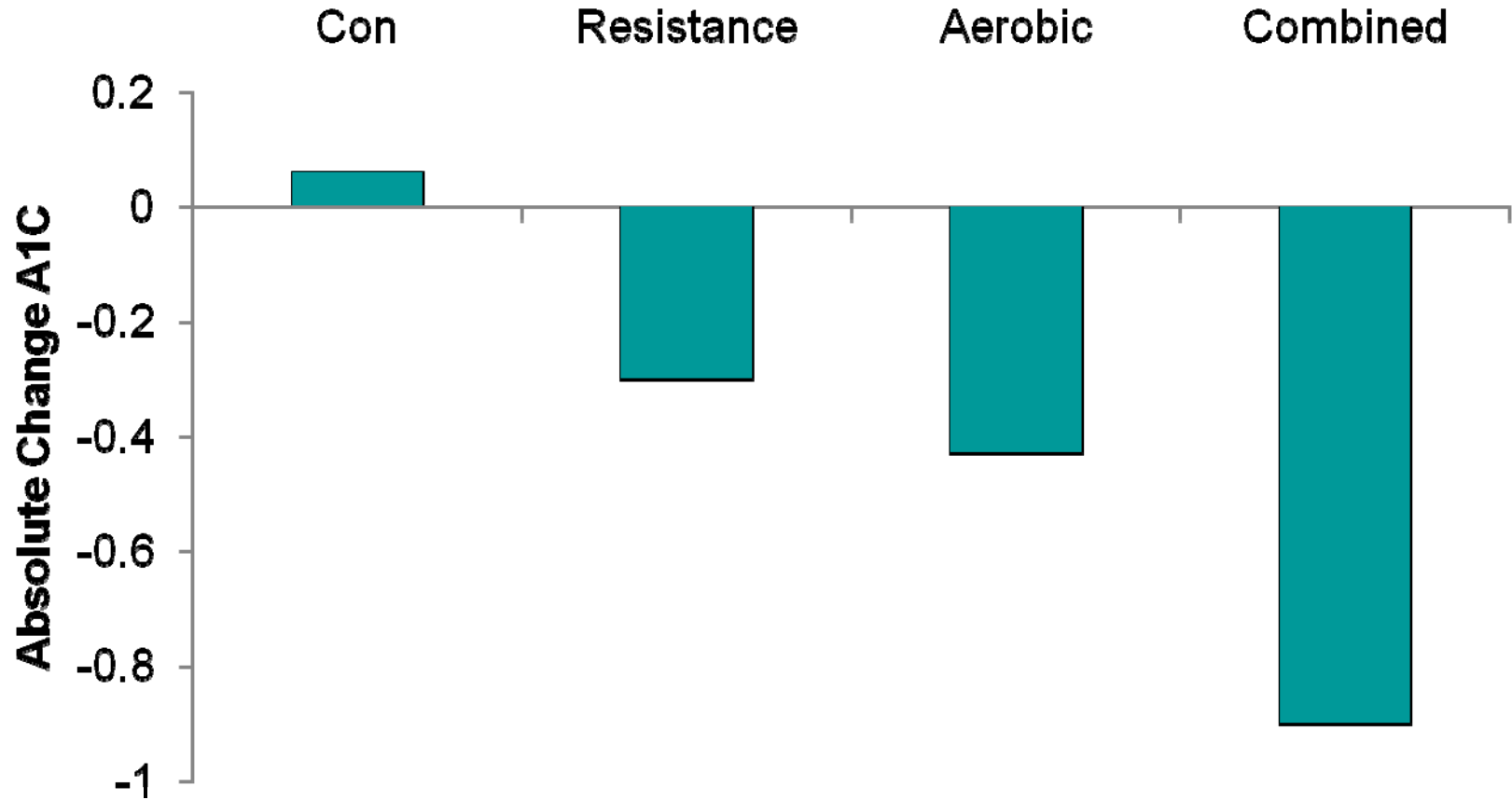
Meta-Analyses: Boule et al., 2001; Boule et al. 2003; Snowling & Hopkins, 2006  
Sigal et al., 2006 ADA Consensus; Bassuk & Manson, 2005, Periera et al. 2009

- Aerobic OR resistance exercise ↓ A1C by ~ 0.7%
- Beneficial effect independent of weight loss
- Dose response effects
- **Aerobic exercise:**
  - 150 minutes per week = reduction A1C of ~0.5-0.9%
  - Direct enhancement insulin sensitivity 24-72 h.
  - Brisk walking is easy to do, consumes glucose & calories
- **Resistance training:**
  - 60-90 minutes/ week ↓ A1C by ~0.5-1.0%
  - Activate muscles not typically used
  - Helps preserve ACTIVE muscle mass
  - Good alternative for those with mobility problems



# Exercise and A1C

Sigal R et al *Ann Int Med* 2007;147:357



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# Practical Message #2: Physical Activity & Exercise gives you CONTROL

- PA & Exercise lowers blood glucose directly by:
  - Increasing glucose uptake
  - Increasing insulin sensitivity
- The benefits occur in a dose-response manner
  - Any Physical Activity is good, but more is better
  - Exercise provides more 'bang for the buck'
- Regular PA can reduce co-morbidities
  - *Exercise is Medicine*<sup>®</sup>

# The Side-Effects of Exercise..... (EIM)

- Reduce risk of death by 40-60%
- Reduce risk of colon cancer by 60%
- Reduce mortality and risk of recurrent breast cancer by 50%
- Reduce incidence of CHD by 40%
- Reduce incidence of hypertension by 40%
- Reduce risk of developing Alzheimers by 40%
- Reduce risk of stroke by 27%
- Decrease depression as effectively as Prozac or cognitive behavioural therapy

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Opportunity is missed by most people because it is dressed in overalls and looks like work

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Thomas Edison

## Most important method of improving physical health, by CHB

	AVDHA	EK	CK	WK	K-G	Ann.
<b>Start / increase exercise sports / physical activity</b>	<b>62%</b>	<b>58%</b>	<b>62%</b>	<b>67%</b>	<b>64%</b>	<b>60%</b>
Change diet / improve eating habits	13%	15%	13%	11%	15%	12%
Lose weight	6%	5%	7%	6%	5%	7%
Quit smoking / reduce amount smoked	6%	5%	6%	3%	5%	9%
Reduce stress level	1%	1%	1%	1%	1%	1%
Receive medical treatment	1%	0%	1%	1%	1%	1%
Take vitamins	0%	1%	0%	0%	0%	0%
Drink less alcohol	0%	0%	0%	0%	0%	0%
Other	5%	7%	5%	6%	3%	4%
Nothing	6%	8%	5%	5%	5%	6%

CHB Survey results (2009) of n=2200 patients



Healthy People, Caring Communities, Valued Healthcare Teams and Partners



# Interesting Relationship DE-Client

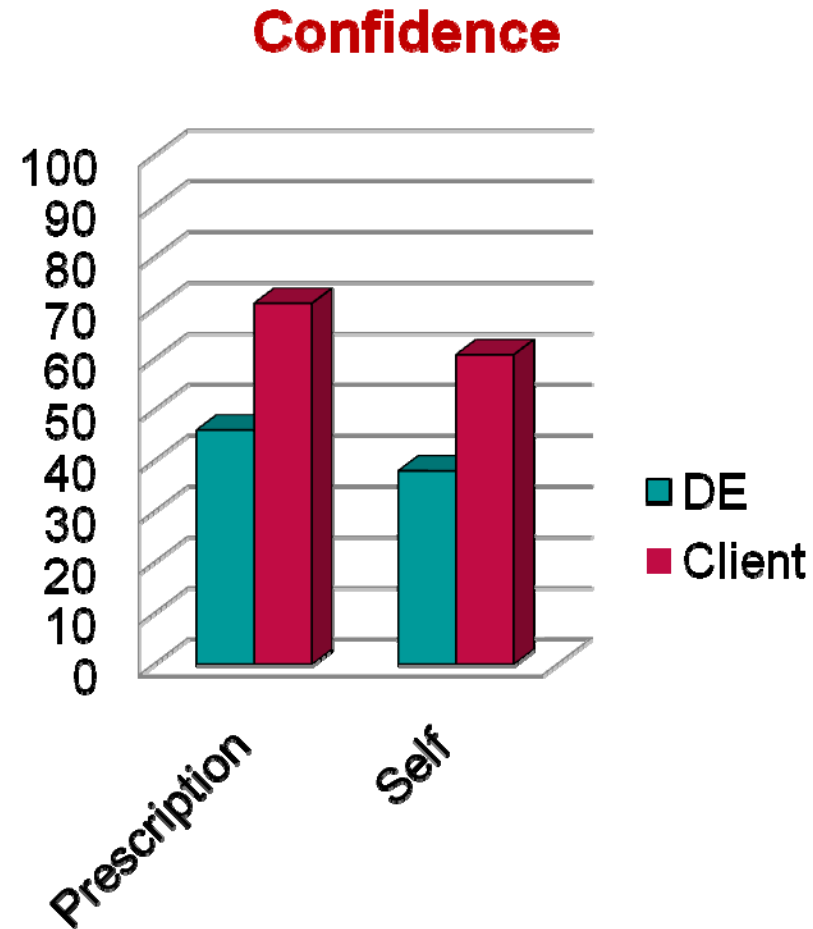
Dillman, Shields, Fowles et al., CJD, 2010

- Identified DE barrier:
  - lack of interest by client (34%)
  - Perceived client attitudes as negative (2.8/5)

however,

Actual confidence by Client  
is **Higher**

Client attitude toward PAE  
is **6/7**



**What you think becomes what  
you say.**

**What you say becomes what  
you do.**

**What you do shapes the world  
around you.**



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# Practical Message #3 – Give the benefit of the doubt

- Many patients are aware PA is good for them
  - But may not know HOW good it can be...
  - Value what physical activity can do for you and your diabetes
  
- Bridge the ‘Awareness-Action’ Gap
  - Individually relevant recommendations
  - Follow with ‘How-to’ information to build confidence

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# Graded PA & Exercise Prescriptions



*“Regular PA is important for health and reducing risks of disease. As your health care provider I recommend you meet the following physical activity prescription”:*

- 1. Increase physical activities in your day and reduce sedentary time.**
  - No more than 2 h per day of recreational screen time
- 2. Begin a regular program of physical activity:**
  - three to four days per week for 10 to 15 minutes per session
- 3. Begin an introductory resistance activity:**
  - one to two days per week for 15 to 30 minutes per session
- 4. Maintain aerobic exercise:**
  - five days per week for a minimum of 30 minutes per session
- 5. Do resistance exercise:**
  - two or more days / week for 30 minutes or more per session

# Tools for the 'How to'

Diabetes Physical Activity & Exercise Toolkit  
2nd Edition, 2010

For diabetes care providers wanting to get their clients moving in the right direction




*"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."  
Albert Einstein*

Planning for Regular Physical Activity **2**



Diabetes Physical Activity & Exercise Toolkit

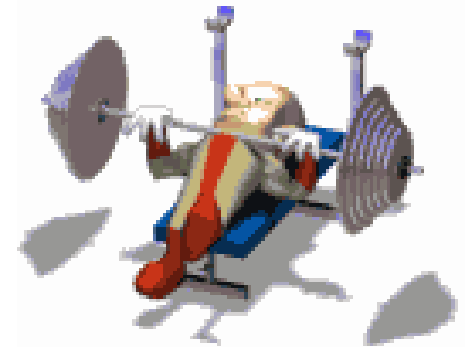
Introductory Resistance Program **3**



Diabetes Physical Activity & Exercise Toolkit

# Low Adherence and Self-efficacy- Patients

- Disease creates challenge for PA and Exercise
  - ↓ ex tolerance, *discomfort*
  - Medications on weight gain; BMI on CRF
  - Obesity on reduction in motivation for PA
- Co morbidities = Restraints & fear of complication
  - may stop someone from starting
- Exercise requires knowledge & skill
  - Exercise is a modern invention
  - Specific individual challenges & techniques





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# Primary Barriers to PA for Patients

- Generalized Barriers

- TIME
- Motivation
- Know how
- Cost, Facilities, Transport

- Disease Dependent Barriers (examples)

- Tend to avoid doing more harm than doing good
  - Loss of blood sugar control (diabetes)
  - Inflammation and soreness (arthritis)
  - Increased heart rate impact (MI, CVD)

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# Practical Message # 4: Relative Risk of Exercise

- Remember that most people are at greater risk from sedentary behaviour than from exercise.
- Be aware of the short-term and long-term complications of diabetes.
- Goals of pre-exercise screening:
  - To identify problems that might make exercise-associated risks outweigh the benefits.
  - To expedite treatment of such problems.

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# Potential exercise-induced adverse events

- **Hypoglycemia (low blood glucose)**→impaired thinking, loss of consciousness, seizures, auto accidents
- **Hyperglycemia (high blood glucose)**/diabetic ketoacidosis or hyperosmolar state.
- **Eyes:** vitreous hemorrhage or retinal detachment→sight loss
- **Neuropathy/PVD**→injuries, infections
- **Cardiovascular:** sudden cardiac death, myocardial infarction, angina, arrhythmia

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# Exercise-induced Hypoglycemia

- Common in type 1 diabetes; can have serious consequences.
- Sometimes occurs in type 2 diabetes if treated with insulin or drugs that increase insulin secretion.
- Can occur during exercise, soon after exercise, and/or many hours after exercise.
- Risk minimized by glucose monitoring, adjustment of insulin and/or carbohydrate intake.

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# Exercise and hyperglycemia: some precipitants

- Brief or intermittent, very intense exercise
- Dehydration
- Insulin omission
- Dietary carbohydrate excess

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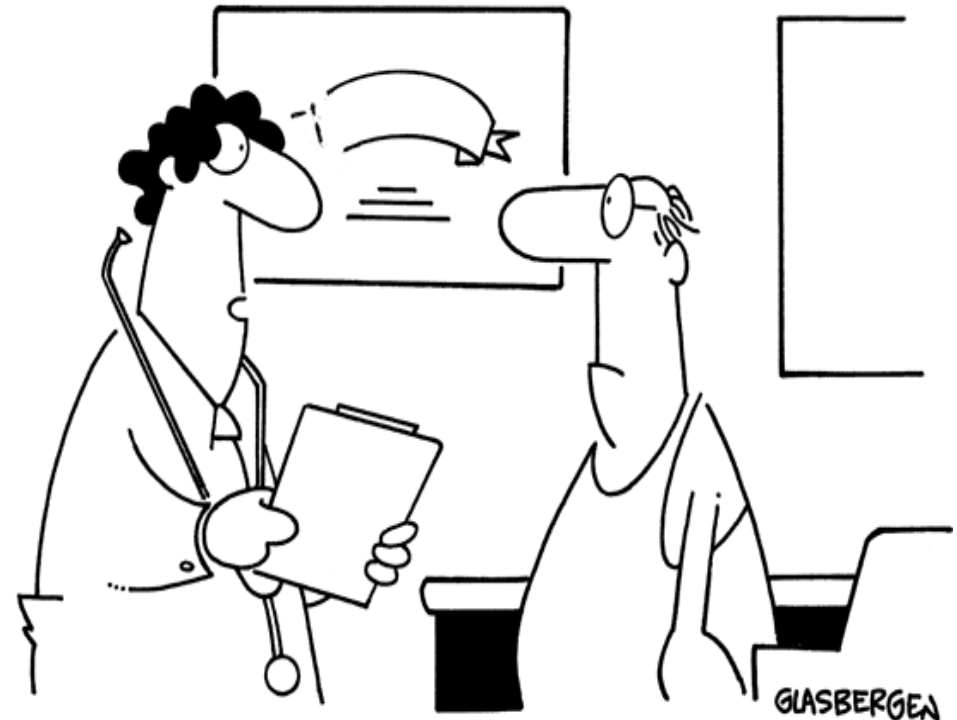
# Hyperglycemia: when is it best to postpone exercise

- If glucose is over 15 and ketones are positive (more than “trace”)
- If glucose is over 20, with or without ketones (although probably ok to proceed if patient feels perfectly well).
- (If exercising with high blood glucose, ensure hydration is adequate, especially in hot weather.)

# Where do we go from here?

- Do we continue to do the same things and expect different results?

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**“At your age, good health is pretty much a thing of the past. My advice is, find an illness you enjoy.”**

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# Summary Points

1. Regular PA should be a consistent message
2. Exercise can give control over their situation
3. Give the benefit of the doubt: bridge the Awareness-Action Gap
4. Remember that most people are at greater risk from sedentary behaviour than from exercise.
5. Think creatively about strategies to include PA Exercise into messages/programs/facilities



# Acknowledgements

This project supported through generous contributions of:

## The Team

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— THE —  
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# World's First Evidence-Based Sedentary Behaviour Guidelines

## Guidelines

For health benefits, children aged 5–11 years should minimize the time they spend being sedentary each day. This may be achieved by



Limiting recreational screen time to no more than 2 hours per day; lower levels are associated with additional health benefits.



Limiting sedentary (motorized) transport, extended sitting and time spent indoors throughout the day.

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[www.csep.ca/guidelines](http://www.csep.ca/guidelines)

Similar guidelines for Teens aged 12-17  
Adult guidelines currently in review