EIM: from theory to practice

Assist. Prof. Visal Kantaratanakul, MD, F.I.M,S.
Director, Rehabilitation Services, Samitivej Groups
Consultant, Cardiac Rehabilitation unit, Faculty of Medicine, Ramathibodi Hospital.
Expert panel on physical activity and exercise, Ministry of Public Health

- We start our first cardiac rehabilitation unit in Thailand at Ramathibodi Hospital, Mahidol University on 1994
- H.M. The King had heart attack on 7 of March and underwent PCI on 10 of March 1995
- Interview on 13th of April 1995

SINCE THEN PEOPLE WITH HEART DISEASE UNDERSTOOD CORRECTLY ABOUT HEART DISEASE AND THE IMPORTANCE OF EXERCISE AFTER HEART DISEASE

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My covers

- EIM by theory
- EIM in motion
- EIM in individual

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Theory: EIM

- a 2007 global initiative launched by the American College of Sports Medicine in collaboration with the American Medical Association.
- the implementation of a physical activity vital sign (PAVS) for each medical visit for every patient

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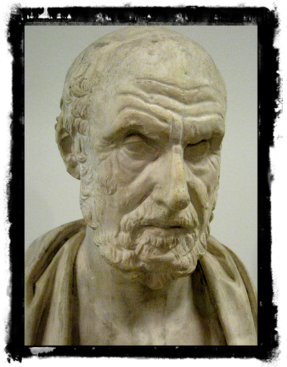
Exercise is Medicine



Hippocrates, c. 460-c. 370 BC

- "All parts of the body which have a function, if used in moderation and exercised in labors in which each is accustomed, become thereby healthy, well developed and age more slowly, but if unused they become liable to disease, defective in growth and age quickly."

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- "If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health."
- " Walking is man's best medicine."

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The theory

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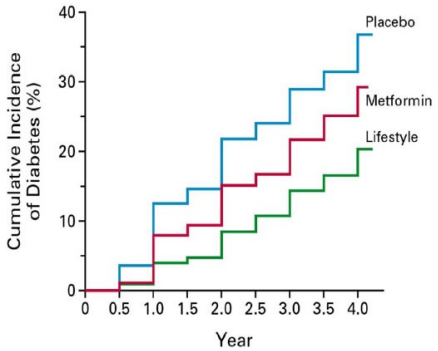
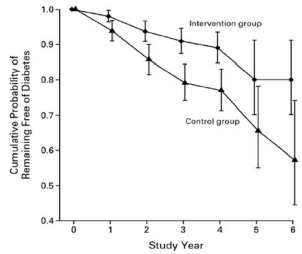
- The average follow-up was 2.8 years.
- The incidence of diabetes was 11.0, 7.8, and 4.8 cases per 100 person-years in the placebo, metformin, and lifestyle groups, respectively.
- The lifestyle intervention reduced the incidence by 58 percent (95 percent confidence interval, 48 to 66 percent) and metformin by 31 percent (95 percent confidence interval, 17 to 43 percent), as compared with placebo;
- the lifestyle intervention was significantly more effective than metformin.
- To prevent one case of diabetes during a period of three years, 6.9 persons would have to participate in the lifestyle- intervention program, and 13.9 would have to receive metformin.



Knowler W, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM.
Reduction in the incidence of type 2 with lifestyle intervention or metformin.
N Engl J Med 2002; 346: 393-403.

- The mean follow-up was 7 years.
- the incidence of type 2 diabetes was 4·3 and 7·4 per 100 person-years in the intervention and control group, respectively (log-rank test p=0·0001), indicating 43% reduction in relative risk.
- The risk reduction was related to the success in achieving the intervention goals of weight loss, reduced intake of total and saturated fat and increased intake of dietary fibre, and increased physical activity.
- Beneficial lifestyle changes achieved by participants in the intervention group were maintained after the discontinuation of the intervention,
- the corresponding incidence rates during the post-intervention follow-up were 4·6 and 7·2 (p=0·0401), indicating 36% reduction in relative risk.

Proportion of subjects without diabetes during the DPS:



Subjects at Risk						
Total no.	507	471	374	167	53	27
Cumulative no. with diabetes:						
Intervention group	5	15	22	24	27	27
Control group	16	37	51	53	57	59

Lindstrom J, Ilanne-Parikka P, Peltonen M, Aunola S, Eriksson J, Hemio K.
Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. Lancet 2006; 368: 1673-1679.

Exercise or exercise and diet for preventing type 2 diabetes mellitus

Review | Intervention

Leonardo J Orozco, Ana Maria Buchleitner, Gabriel Gimenez-Perez, Marta Roqué i Figuls, Bernd Richter, Didac Mauricio

First published: 16 July 2008

Editorial Group: Cochrane Metabolic and Endocrine Disorders Group

DOI: 10.1002/14651858.CD003054.pub3 View/save citation

Cited by: 51 articles Citation tools

Am score 38

See clinical summaries based on this review

We included eight trials with 2241 participants randomised to exercise and diet intervention and 2509 participants to standard recommendation. Furthermore, 178 participants were randomised to an exercise only intervention and 167 participants to a diet only intervention. The duration of the interventions in the trials ranged from one year to six years. Interventions varied between studies but mainly consisted of caloric restriction if the person was overweight, low fat content (especially saturated fat), high carbohydrate content and the increase of fibre intake. Physical activity varied but on average at least 150 minutes each week of brisk walking or other activities such as cycling or jogging were recommended. Interventions were mainly delivered by frequent individual counselling by a physiotherapist, an exercise physiologist and a dietitian. Incidence of diabetes was reduced by 37% (relative risk reduction) with exercise and diet. This had favourable effects on body weight, waist circumference and blood pressure. More evidence is required on effects of exercise alone in the prevention of type 2 diabetes. No study reported relevant data on diabetes and cardiovascular related morbidity, all-cause mortality and quality of life.

Analysis 1.1. Comparison 1 Exercise+diet vs standard recommendations (overall analysis), Outcome 1 Diabetes incidence - ITT (RR/HR).

Review: Exercise or exercise and diet for preventing type 2 diabetes mellitus

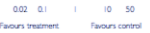
Comparison: 1 Exercise+diet vs standard recommendations (overall analysis)

Outcome: 1 Diabetes incidence - ITT (RR/HR)

Study or subgroup	log [risk/hazard ratio] (SE)	risk/hazard ratio IV,Random,95% CI	Weight	risk/hazard ratio IV,Random,95% CI
Bo 2007	-1.2378744 (0.54891893)		4.2 %	0.29 [0.10, 0.85]
Da Qing 1997	-0.491961 (0.24246088)		13.8 %	0.61 [0.38, 0.98]
DPP 2002	-0.69311472 (0.08670098)		26.3 %	0.50 [0.42, 0.59]
DPS 2001	-0.3011051 (0.15999725)		19.9 %	0.74 [0.54, 1.01]
IDPP 2006	-0.3011051 (0.13031266)		22.6 %	0.74 [0.57, 0.96]
Kosaka 2005	-1.2039728 (0.60385806)		3.6 %	0.30 [0.09, 0.98]
Oldroyd 2005	-0.2231436 (0.41917066)		6.6 %	0.80 [0.35, 1.82]
Wing 1998	0.69314718 (0.66948984)		3.0 %	2.00 [0.54, 7.43]
Total (95% CI)			**100.0 %**	**0.63 [0.49, 0.79]**

Heterogeneity: $Tau^2 = 0.05$; $Chi^2 = 15.47$, $df = 7$ ($P = 0.03$); $I^2 = 55\%$

Test for overall effect: $Z = 3.85$ ($P = 0.00012$)



Analysis 1.2. Comparison 1 Exercise+diet vs standard recommendations (overall analysis), Outcome 2 Diabetes incidence - ITT (OR/HR).

Review: Exercise or exercise and diet for preventing type 2 diabetes mellitus

Comparison: 1 Exercise+diet vs standard recommendations (overall analysis)

Outcome: 2 Diabetes incidence - ITT (OR/HR)

Study or subgroup	log [odds/hazard ratio] (SE)	odds/hazard ratio IV,Random,95% CI	Weight	odds/hazard ratio IV,Random,95% CI
Bo 2007	-1.3093333 (0.56979393)		4.3 %	0.27 [0.09, 0.82]
Da Qing 1997	-0.4919613 (0.24246088)		16.5 %	0.61 [0.38, 0.98]
DPP 2002	-0.8915981 (0.11105053)		32.4 %	0.41 [0.33, 0.51]
DPS 2001	-0.5798185 (0.20915788)		19.6 %	0.56 [0.37, 0.84]
IDPP 2006	-0.5798185 (0.24832886)		16.0 %	0.56 [0.34, 0.91]
Kosaka 2005	-1.2729657 (0.62853399)		3.6 %	0.28 [0.08, 0.96]
Oldroyd 2005	-0.2876821 (0.54009742)		4.8 %	0.75 [0.26, 2.16]
Wing 1998	0.77932488 (0.74816135)		2.6 %	2.18 [0.50, 9.45]
Total (95% CI)			**100.0 %**	**0.51 [0.40, 0.65]**

Heterogeneity: $Tau^2 = 0.04$; $Chi^2 = 10.45$, $df = 7$ ($P = 0.16$); $I^2 = 33\%$

Test for overall effect: $Z = 5.38$ ($P < 0.00001$)

Analysis 2.2. Comparison 2 Exercise vs standard recommendations (overall analysis), Outcome 2 Diabetes incidence - ITT (OR/HR).

Review: Exercise or exercise and diet for preventing type 2 diabetes mellitus

Comparison: 2 Exercise vs standard recommendations (overall analysis)

Outcome: 2 Diabetes incidence - ITT (OR/HR)

Study or subgroup	log [odds/hazard ratio] (SE)	odds/hazard ratio IV,Random,95% CI	Weight	odds/hazard ratio IV,Random,95% CI
Da Qing 1997	-0.6374644 (0.24246092)		77.2 %	0.53 [0.33, 0.85]
Wing 1998	0.39877612 (0.80165366)		22.8 %	1.49 [0.31, 7.17]
Total (95% CI)			**100.0 %**	**0.67 [0.29, 1.57]**

Heterogeneity: $Tau^2 = 0.19$; $Chi^2 = 1.53$, $df = 1$ ($P = 0.22$); $I^2 = 35\%$

Test for overall effect: $Z = 0.92$ ($P = 0.36$)

Analysis 2.1. Comparison 2 Exercise vs standard recommendations (overall analysis), Outcome 1 Diabetes incidence - ITT (RR/HR).

Review: Exercise or exercise and diet for preventing type 2 diabetes mellitus

Comparison: 2 Exercise vs standard recommendations (overall analysis)

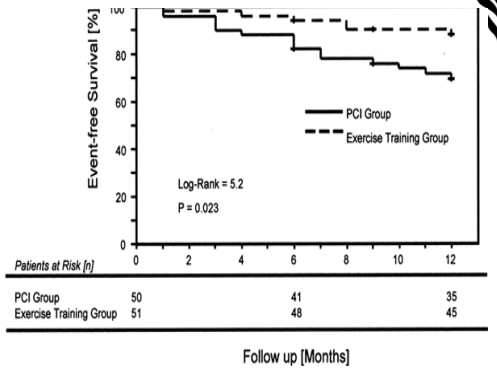
Outcome: 1 Diabetes incidence - ITT (RR/HR)

Study or subgroup	log [risk/hazard ratio] (SE)	risk/hazard ratio IV,Random,95% CI	Weight	risk/hazard ratio IV,Random,95% CI
Da Qing 1997	-0.6374644 (0.24246092)		73.3 %	0.53 [0.33, 0.85]
Wing 1998	0.36464311 (0.72574219)		26.7 %	1.44 [0.35, 5.97]
Total (95% CI)			**100.0 %**	**0.69 [0.29, 1.65]**

Heterogeneity: $Tau^2 = 0.21$; $Chi^2 = 1.72$, $df = 1$ ($P = 0.19$); $I^2 = 42\%$

Test for overall effect: $Z = 0.83$ ($P = 0.40$)

Event-free survival after 12 months was significantly superior in the exercise training group versus PCI group (P = 0.023 by log-rank test)



Hambrecht, R., C. Walther, S. Mobius-Winkler, S. Gielen, A. Linke, K. Conradi, S. Erbs, R. Kluge, K. Kendziorra, O. Sabri, P. Sick, G. Schuler. Percutaneous coronary angioplasty compared with exercise training in patients with stable coronary artery disease. Circulation 109: 1371-1378, 2004.

Special Report

Effect Size Estimates of Lifestyle and Dietary Changes on All-Cause Mortality in Coronary Artery Disease Patients

A Systematic Review

J.A. Iestra, RD; D. Kromhout, MPH, PhD; Y.T. van der Schouw, PhD; D.E. Grobbee, MD, PhD; H.C. Boshuizen, PhD; W.A. van Staveren, PhD

Background—Guidelines for lifestyle and dietary modification in patients with coronary artery disease (CAD) are mainly supported by evidence from general population studies. CAD patients, however, differ from the general population in age (older) and treatment with preventive drugs. This review seeks to provide evidence for a prognostic benefit of lifestyle and dietary recommendations from studies in CAD patients.

Methods and Results—A literature search was performed on the effect of lifestyle and dietary changes on mortality in CAD patients. Prospective cohort studies and randomized controlled trials of patients with established CAD were included if they reported all-causes mortality and had at least 6 months of follow-up. The effect estimates of smoking cessation (relative risk [RR], 0.64; 95% CI, 0.58 to 0.71), increased physical activity (RR, 0.76; 95% CI, 0.59 to 0.98), and moderate alcohol use (RR, 0.80; 95% CI, 0.78 to 0.83) were studied most extensively. For the 6 dietary goals, data were too limited to provide reliable effect size estimates. Combinations of dietary changes were associated with reduced mortality (RR, 0.56; 95% CI, 0.42 to 0.74).

Conclusions—Available studies show convincingly the health benefits of lifestyle changes in CAD patients. Effect estimates of combined dietary changes look promising. Future studies should confirm these findings and assess the contribution of the individual dietary factors. (***Circulation*. 2005;112:924-934.**)

Key Words: coronary disease ■ diet ■ lifestyle ■ mortality ■ patients

Table 1. Approximate Mortality Reduction Potential of Lifestyle Changes Estimated from Studies in Coronary Artery Disease Patients: Comparison with Preventive Drug Interventions after Myocardial Infarction [21]

Intervention	*Mortality Risk Reduction*
Low-dose aspirin	18%
Moderate alcohol	20%
Statins	21%
β-Blockers	23%
Physical activity	25%
ACE inhibitors	26%
Smoking cessation	35%
Combined dietary changes	45%

Iestra JA, Kromhout D, van der Schouw YT, et al. Effect size estimates of lifestyle and dietary changes on all-cause mortality in coronary artery disease patients: A systematic review. Circulation 2005;112:924-934.

TABLE 4. Approximate Mortality Reduction Potential of Lifestyle and Dietary Changes Estimated From Studies in CAD Patients and the General Population

Recommendation	Mortality Risk Reduction Estimated From Studies in CAD Patients	Mortality Risk Reduction Estimated From Cohort Studies in General Population
Smoking cessation	35%	50%
Physical activity	25%	20%–30%
Moderate alcohol	20%	15%
Combined dietary changes	45%	15%–40%

Iestra JA, Kromhout D, van der Schouw YT, et al. Effect size estimates of lifestyle and dietary changes on all-cause mortality in coronary artery disease patients: A systematic review. Circulation 2005;112:924-934.

Eur J Epidemiol (2015) 30:529–542
DOI 10.1007/s10654-015-0056-z

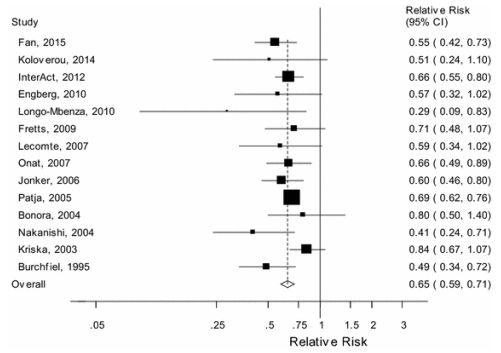
CrossMark

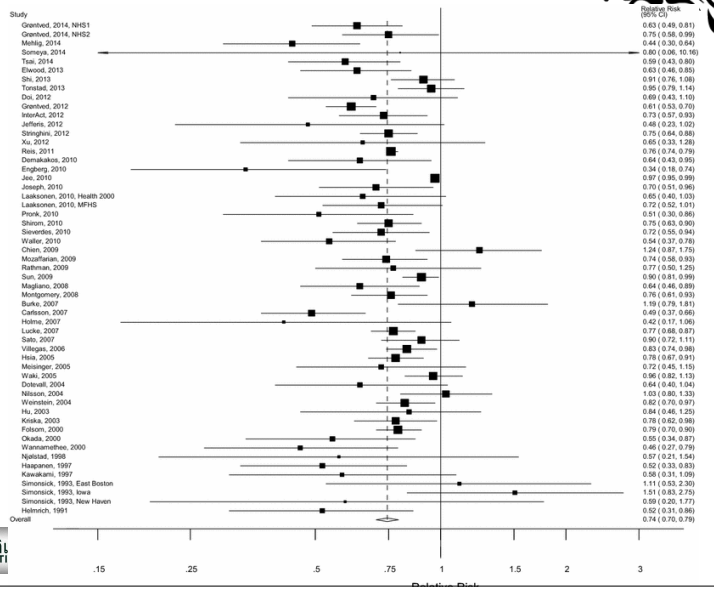
META-ANALYSIS

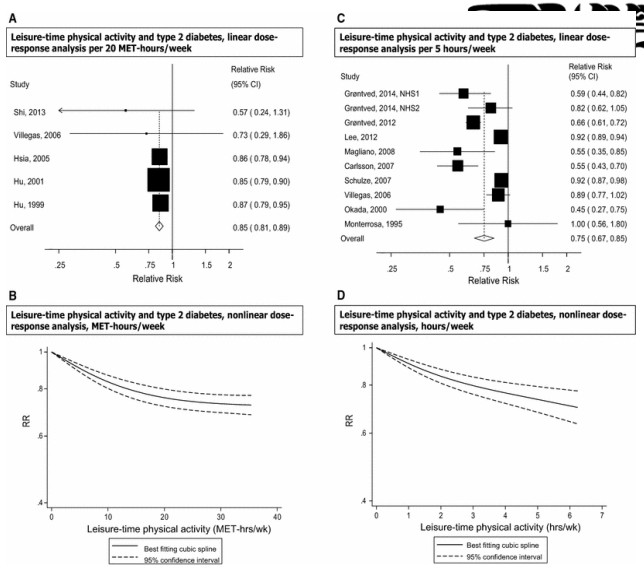
Physical activity and the risk of type 2 diabetes: a systematic review and dose–response meta-analysis

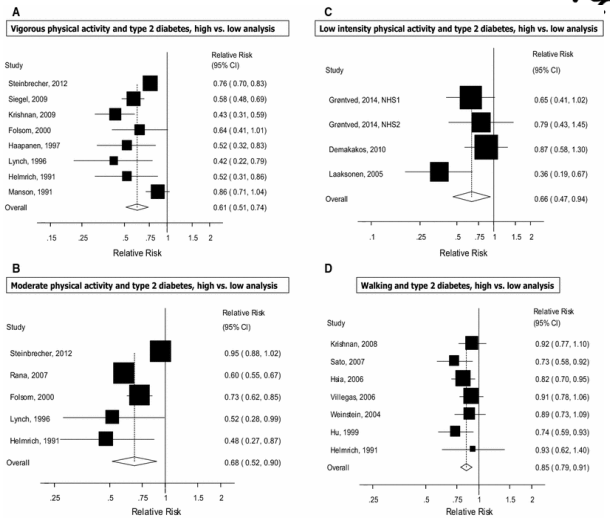
Dagfinn Aune[1,2] · Teresa Norat[2] · Michael Leitzmann[3] · Serena Tonstad[4] · Lars Johan Vatten[1]

Received: 28 August 2014 / Accepted: 9 June 2015 / Published online: 20 June 2015









Endocrine (2016) 51:390–401
DOI 10.1007/s12020-015-0792-6

REVIEW

Exercise and diabetes: relevance and causes for response variability

Anja Böhm[1,2,3] · Cora Weigert[1,2,3] · Harald Staiger[1,2,3] · Hans-Ulrich Häring[1,2,3]

Received: 10 September 2015 / Accepted: 28 October 2015 / Published online: 7 December 2015

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Table 1 Quantity of non-responders

Citation	Population	Intervention	Duration	Outcome	Non-responders (%)[a]
Boulé [41]	n = 596, healthy	Endurance training, 3×/week, 55–75 % VO_2max,	20 weeks	Insulin sensitivity	42
Borel [46]	n = 104, abdominally obese/dyslipidemic	160 min/week moderate-intensity exercise and −500 kcal per day, pedometer use	12 months	Glucose tolerance status	62.5
Hagberg [49]	n = 110, healthy	endurance training, 3×/week, 50–70 % VO_2max	26 weeks	Insulin sensitivity	25
Yates [45]	n = 29, prediabetic	education program with pedometer use	12 months	2-h glucose	7[b]
Winett [44]	n = 159, prediabetic	Resistance training, 2 ×/week	3 months	2-h OGTT	44[c]
Stephens [48]	n = 42, diabetic	Aerobic, resistance training, or combination thereof	9 months	Combination of HbA1c, % body fat, BMI, muscle mitochondrial content	21
Osler [47]	n = 14, prediabetic	Nordic walking, 5 h/week, unsupervised	20 weeks	Glucose tolerance status	36

Quantity of non-responders with respect to glucose homeostasis
[a] Meaning no improvement, unless stated otherwise
[b] Adverse response
[c] Estimated from graph

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Nikander *et al. BMC Medicine* 2010, **8**:47
http://www.biomedcentral.com/1741-7015/8/47

BMC Medicine

RESEARCH ARTICLE Open Access

Targeted exercise against osteoporosis: A systematic review and meta-analysis for optimising bone strength throughout life

Riku Nikander[1,2,3*], Harri Sievänen[2,3], Ari Heinonen[4], Robin M Daly[1], Kirsti Uusi-Rasi[2,3], Pekka Kannus[2,3,5,6]

Abstract

Background: Exercise is widely recommended to reduce osteoporosis, falls and related fragility fractures, but its effect on whole bone strength has remained inconclusive. The primary purpose of this systematic review and meta-analysis was to evaluate the effects of long-term supervised exercise (≥6 months) on estimates of lower-extremity bone strength from childhood to older age.

Methods: We searched four databases (PubMed, Sport Discus, Physical Education Index, and Embase) up to October 2009 and included 10 randomised controlled trials (RCTs) that assessed the effects of exercise training on whole bone strength. We analysed the results by age groups (childhood, adolescence, and young and older adulthood) and compared the changes to habitually active or sedentary controls. To calculate standardized mean differences (SMD; effect size), we used the follow-up values of bone strength measures adjusted for baseline bone values. An inverse variance-weighted random-effects model was used to pool the results across studies.

Results: Our quality analysis revealed that exercise regimens were heterogeneous; some trials were short in duration and small in sample size, and the weekly training doses varied considerably between trials. We found a small and significant exercise effect among pre- and early pubertal boys [SMD, effect size, 0.17 (95% CI, 0.02-0.32)], but not among pubertal girls [-0.01 (-0.18 to 0.17)], adolescent boys [0.10 (-0.75 to 0.95)], adolescent girls [0.21 (-0.53 to 0.97)], premenopausal women [0.00 (-0.43 to 0.44)] or postmenopausal women [0.00 (-0.15 to 0.15)]. Evidence based on per-protocol analyses of individual trials in children and adolescents indicated that programmes incorporating regular weight-bearing exercise can result in 1% to8% improvements in bone strength at the loaded skeletal sites. In premenopausal women with high exercise compliance, improvements ranging from 0.5% to 2.5% have been reported.

Conclusions: The findings from our meta-analysis of RCTs indicate that exercise can significantly enhance bone strength at loaded sites in children but not in adults. Since few RCTs were conducted to investigate exercise effects on bone strength, there is still a need for further well-designed, long-term RCTs with adequate sample sizes to quantify the effects of exercise on whole bone strength and its structural determinants throughout life.

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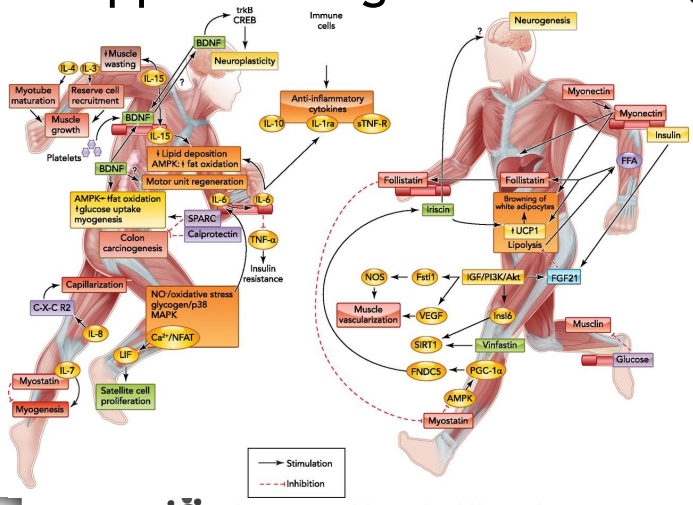
What happen during exercise



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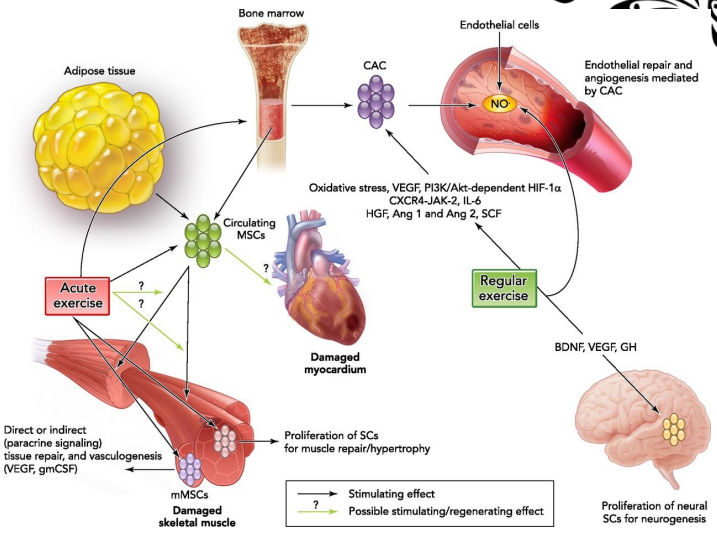

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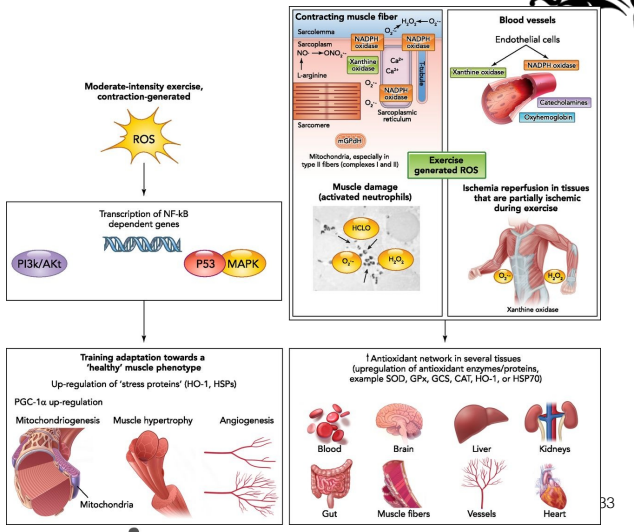

Physical exercise, reactive oxygen species and neuroprotection

Zsolt Radak [a,b,*], Katsuhiko Suzuki [b], Mitsuru Higuchi [b], Laszlo Balogh [c], Istvan Boldogh [d], Erika Koltai [a]

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Neuronal stem cells

ABSTRACT

Regular exercise has systemic beneficial effects, including the promotion of brain function. The adaptive response to regular exercise involves the up-regulation of the enzymatic antioxidant system and modulation of oxidative damage. Reactive oxygen species (ROS) are important regulators of cell signaling. Exercise, via intensity-dependent modulation of metabolism and/or directly activated ROS generating enzymes, regulates the cellular redox state of the brain. ROS are also involved in the self-renewal and differentiation of neuronal stem cells and the exercise-mediated neurogenesis could be partly associated with ROS production. Exercise has strong effects on the immune system and readily alters the production of cytokines. Certain cytokines, especially IL-6, IL-1, TNF-α, IL-18 and IFN gamma, are actively involved in the modulation of synaptic plasticity and neurogenesis. Cytokines can also contribute to ROS production. ROS-mediated alteration of lipids, protein, and DNA could directly affect brain function, while exercise modulates the accumulation of oxidative damage. Oxidative alteration of macromolecules can activate signaling processes, membrane remodeling, and gene transcription. The well known neuroprotective effects of exercise are partly due to redox-associated adaptation.

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The Nobel Prize in Physiology or Medicine 2016

Photo: Mari Honda
Yoshinori Ohsumi
Prize share: 1/1

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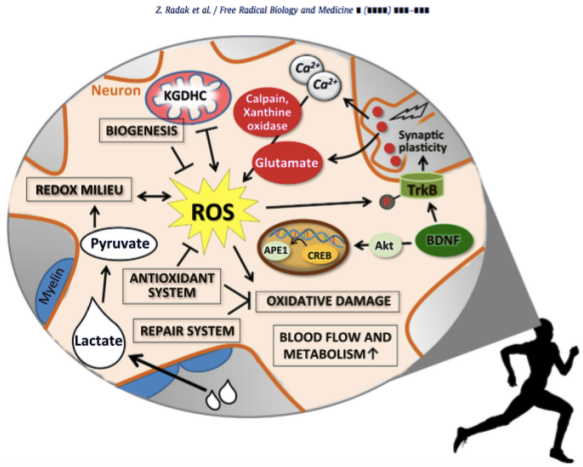

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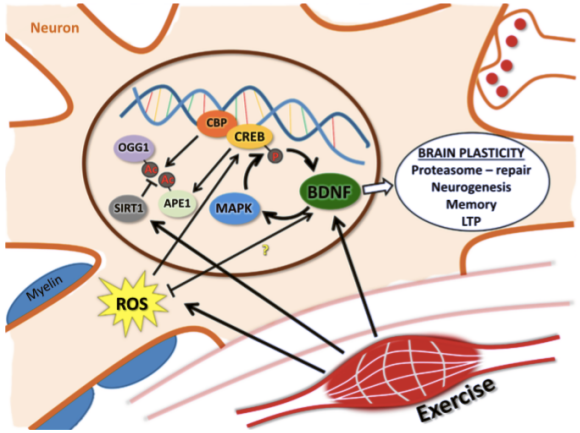
Z. Radak et al. / Free Radical Biology and Medicine ■ (■■■■) ■■■–■■■



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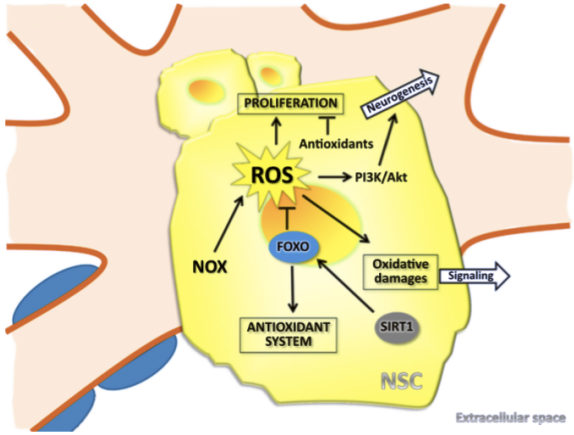

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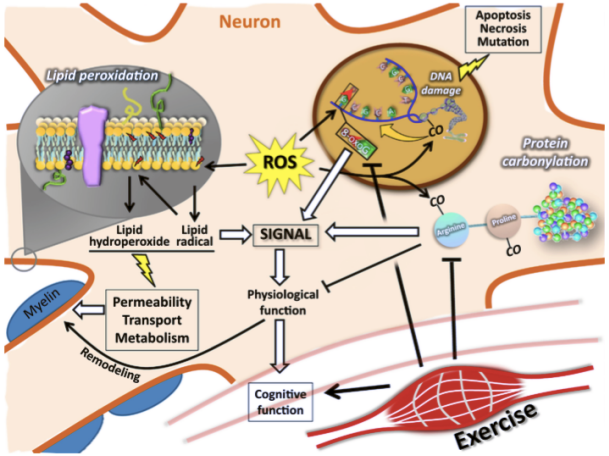

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Clinical trial

- **Phase I:** Researchers test a new drug or treatment in a small group of people for the first time to evaluate its safety, determine a safe dosage range, and identify side effects.
- **Phase II:** The drug or treatment is given to a larger group of people to see if it is effective and to further evaluate its safety.
- **Phase III:** The drug or treatment is given to large groups of people to confirm its effectiveness, monitor side effects, compare it to commonly used treatments, and collect information that will allow the drug or treatment to be used safely.
- **Phase IV:** Studies are done after the drug or treatment has been marketed to gather information on the drug's effect in various populations and any side effects associated with long-term use.

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Conclusion for theory

Exercise is medicine and pass

the clinical trial phase IV

The Practice

INVITED COMMENTARY

Exercise — The Medicine We Should All Prescribe

Thomas M. Best, MD, PhD

Introduction

"Walking is the best medicine."
(Hippocrates, c. 460-c. 370 BC)

Regular exercise and a physically active lifestyle have unequivocal beneficial effects on health. Compared with drugs, exercise is available at relatively low cost and, for the most part, free of adverse effects. Exercise produces similar or, in many cases, greater benefit than prescription drugs in the secondary prevention of coronary artery disease, treatment of heart failure, prevention of diabetes, and poststroke rehabilitation (3). So the question remains — why has it taken so

response to exercise? How does that dose-response relationship change over time? Help seems to be on the way with innovative curriculum now present in at least two medical schools to address medical provider deficiencies in knowledge about exercise and its importance to human health. How this will translate to more effective exercise prescription strategies remains unknown but it is a critical step in educating all health care providers about the overwhelming importance of exercise in our daily lives.

Despite the overwhelming evidence for exercise as a "polypharmacy pill," there is less evidence that physician-led interventions are effective, particularly at the population level. A recent systematic review of primary care-based

The Practice

Call to Action on Making Physical Activity Assessment and Prescription a Medical Standard of Care

Robert E. Sallis, MD, FACSM[1]; Jason M. Matuszak, MD, FAAFP[2]; Aaron L. Baggish, MD, FACC, FACSM[3]; Barry A. Franklin, PhD, FACSM[4]; Wojtek Chodzko-Zajko, PhD, FACSM[5]; Barbara J. Fletcher, RN, MSN, FAAN, FPCNA[6]; Andrew Gregory, MD, FAAP, FACSM[7]; Elizabeth Joy, MD, MPH, FACSM[8]; Gordon Matheson, MD, PhD, FACSM[9]; Patrick McBride, MD, MPH, FACC[10]; James C. Puffer, MD, FACSM[11]; Jennifer Trilk, PhD[12]; and Janet Williams, MA[13]

Abstract
The U.S. population is plagued by physical inactivity, lack of cardiorespiratory fitness, and sedentary lifestyles, all of which are strongly associated with the emerging epidemic of chronic disease. The time is right to incorporate physical activity assessment and promotion into health care in a manner that engages clinicians and patients. In April 2015, the American College of Sports Medicine and Kaiser Permanente convened a joint consensus meeting of subject matter experts from stakeholder organizations to discuss the development and implementation of a physical activity vital sign (PAVS) to be obtained and recorded at every medical visit for every patient. This statement represents a summary of the discussion, recommendations, and next steps developed during the consensus meeting. Foremost, it is a "call to action" for current and future clinicians and the health care community to implement a PAVS in daily practice with every patient.

Introduction/Purpose

Nearly 60 years ago, President Eisenhower established the President's Council on Fitness and Sports (originally named the President's Council on Youth Fitness) in response to growing concern for the deteriorating level of American youth physical fitness. Despite this and many other national health initiatives that emphasize physical activity in both children and adults, the U.S. population is still plagued by physical inactivity, lack of cardiorespiratory fitness, and sedentary lifestyles, all of which are strongly associated with

Physical inactivity: the biggest public health problem of the 21st century

Steven N Blair

There is now overwhelming evidence that regular physical activity has important and wide-ranging health benefits. These range from reduced risk of chronic diseases such as heart disease, type 2 diabetes, and some cancers to enhanced function and preservation of function with age. As a member of the geriatric set, I am personally delighted that there is strong emerging evidence that activity delays cognitive decline and is good for brain health as well as having extensive benefits for the rest of the body.

I believe that evidence supports the conclusion that physical inactivity is one of the most important public health

that low cardiorespiratory fitness accounts for about 16% of all deaths in both women and men in this population, and this is substantially more, with the exception of hypertension in men, than the other risk factors. I ask you to consider how often each of these risk factors is evaluated in a typical medical examination, and how often each risk factor is treated if found to be elevated. I have no data, but I wager that the typical physician is 10–50 times more likely to measure cholesterol, blood pressure, and BMI than to measure fitness. Fitness was measured in the ACLS with a maximal exercise test on a treadmill, so this

data in figure 2 clearly show a strong inverse gradient for CVD death across fitness categories within each BMI category. Note that the obese men who were moderately/highly fit had less than half the risk of dying than the normal-weight men who were unfit. Every day tens of thousands of patients with type 2 diabetes attend a medical evaluation. How many of these patients have their height and weight measured and their BMI calculated, after which they are assigned to either the normal weight, overweight, or obese category? Conversely, how many of these patients have their cardiorespiratory fitness evaluated, or even have a careful and accurate physical activity history obtained? My guess is that if the physician mentions physical activity it may be "I think you should take up some exercise, it will help you lose weight". This is the wrong message. Of course regular physical activity will help with weight management, but the activity will be very important to the patient's health, whether or not they lose weight.

As you can tell, I am passionate about

Br J Sports Med January 2009 Vol 43 No 1

Physical activity as medicine: time to translate evidence into clinical practice

Mai-Lis Hellénius,[1] Carl Johan Sundberg[2]

EDITOR'S CHOICE

Follow-up investigations of large cohorts of men and women in USA demonstrate that a low cardiorespiratory fitness constitutes the largest attributable fraction for all cause death.[1] These findings are highly relevant for a majority of populations all over the world. Sedentary lifestyle is a dangerous modern health threat. Physical inactivity is linked to almost all common health problems including cardiovascular diseases, type II diabetes, obesity/overweight, cancer, dementia and depression. Furthermore, the great value of physical

The prescription can be used for prevention and/or treatment. All healthcare professionals can prescribe physical activity. It is essential that the prescription be based on the individual situation and on a dialogue between patient and clinician. The written prescription is usually made on a special prescription form.

A Swedish study in primary healthcare on patients receiving physical activity on prescription demonstrated good adherence after 6 months. A majority of patients reported adhering fully to the prescription (65%). Partial adherence was reported by 19% and only 16% reported total non-

recommendations for physical activity in diseases and conditions within cardiovascular and metabolic medicine, psychiatry, orthopaedics, neurology, gastrointestinal medicine, nephrology, rheumatology, pulmonary medicine and more. The handbook is especially tailored to help health professionals prescribe physical activity. The method is currently used by well over half of all general practice units in Sweden; our international colleagues see no reason why that should not be the case in many parts of the world. The book (in English) is available for personal use from http://www.fyss.se as a pdf-file.

Acknowledgements M-LH is Board Member and CJS is chair of Professional Associations for Physical Activity, a sub-association of the Sports Medicine section of the Swedish Society of Medicine

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Mai-Lis Hellénius and Carl Johan Sundberg
Br J Sports Med 2011 45: 158

DPAC in Thailand

KPI

- Quantitative KPI
  - DPAC @ General Hospital 100 %
  - DPAC @ Community Hospital 80 %
- Qualitative KPI
  - DPAC Quality
  - NCD Clinic and DPAC Clinic Certified

PROGRESS IN CARDIOVASCULAR DISEASES 57 (2015) 375–386

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Progress in Cardiovascular Diseases

Strategies for Promoting Physical Activity in Clinical Practice

CrossMark

Robert Sallis[a,*], Barry Franklin[b], Liz Joy[c], Robert Ross[d], David Sabgir[e], James Stone[f]

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PROGRESS IN CARDIOVASCULAR DISEASES 57 (2015) 375–386

Program success stories

- EIM initiative
- Exercise assessment and prescription
- The PA Vital Sign
- The exercise prescription
- Providing PA advice in the exam room
- Integrating PA into daily life

Physical Activity Vital Sign in HELP2

1. On average, ***how many days a week*** do you perform physical activity or exercise?
2. On average, ***how many total minutes*** of physical activity or exercise do you perform on those days?
   days/week X minutes/day = min/week (PAVS)
3. Describe the ***intensity*** of your physical activity or exercise:
   light = casual walk **moderate** = brisk walk **vigorous** = jogging

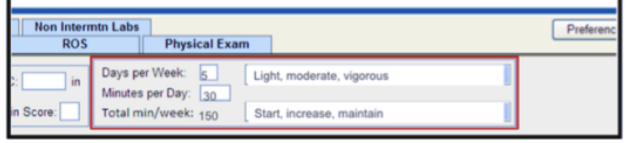

Fig 3 – Intermountain Healthcare Physical Activity Vital Sign.

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Theory——-> Practice

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TABLE 2. Integrating the 5As behavior change approach into a busy office environment

If you have	Then
No time	Point out your concerns and arrange follow-up. *"Your exam showed some wellness issues that I'd like to discuss with you at a future appointment. My MA will give you a handout and can help you schedule an appointment where we can talk."*
1 minute	☐ **ADVISE** briefly on one of the patient's most important risks. ☐ **ASSIST** by providing a patient education handout or link to online information. ☐ **ARRANGE** a follow-up appointment or specialist referral. *For example: "You know, 150 minutes of moderate-intensity physical activity each week is important to your health, and it looks like you're only getting about 60 minutes. Here's some information to help you increase your activity level. I'd like to discuss this more with you at a future appointment. How does that sound?"*
2 to 5 minutes	**Above plus:** ☐ **ADVISE** further about the importance of relevant behavior changes ☐ **AGREE** mutually on a goal and document the goal and a follow-up plan on a brief prescription such at the ***Rx to Live Well*** save a copy in the patient's chart. *For example: "You know, 150 minutes of moderate-intensity physical activity each week is important to your health, and it looks like you're getting only 60 minutes. Can you think of a way to increase your activity that you feel ready to take on?" ..... "Great. I'll keep that goal in your record. I'd like you to keep track of how you're doing, and then I'd like to check on your progress in a few months."*
5 to 10 minutes or more	**Above plus:** ☐ **Use more open-ended questions to assess readiness and help the patient focus on an effective goal** *For example: "I'm noticing a few issues that put you at risk for other health problems. It looks like you're not getting enough physical activity or sleep, and you've mentioned you drink a lot of soda. Which of these concerns you the most?" ..... "You'd like to get more active — that's great. What are some ways you could increase your activity?" ..... "Okay, out of those, which do you feel you are ready and able to do?" ..... "Great. Let's write that as your goal. Here's a prescription and an Action Plan — people who make a plan often do better with their goals. My MA can help you with a follow-up appointment so I can check on your progress in a few months."*

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Your Prescription for Health

ExeRcise is Medicine®

Name: _____ Date: _____

❑ **Aerobic Activity**

Type: Walk Run Swim Bike Other_____

Frequency (days/week): 2 3 4 5 6 7

Intensity: Light (A Casual Walk) Moderate (A Brisk Walk) Vigorous (Jogging or Running)

Time (minutes/day): 10 20 30 60 60 or more

Steps/day: 2,500 5,000 7,500 10,000 More than 10,000

❑ **Strength Training**

- Muscle strengthening should be done at least two days per week
- Exercise should be done to strengthen all major muscle groups: legs, hips, back, chest, abdomen, shoulder, arms
- For each exercise, 8-12 repetitions should be completed
- Examples include bodyweight exercise (e.g. push-ups, lunges), carrying heavy loads, and heavy gardening

Physician Signature: _____

What do we know about physical activity?

- Regular physical activity can protect your joints, prevent falls and injuries, and reduce your risk of disease, such as type 2 diabetes, high blood pressure, heart attacks, and some cancers.
- Improving your fitness can be as important, or more, than losing weight.
- It is also important to avoid inactivity (*i.e.*, the amount of time you spend sitting) as much as possible. Studies suggest limiting your sedentary time to less than 6-8 hours a day.

What about aerobic activity?

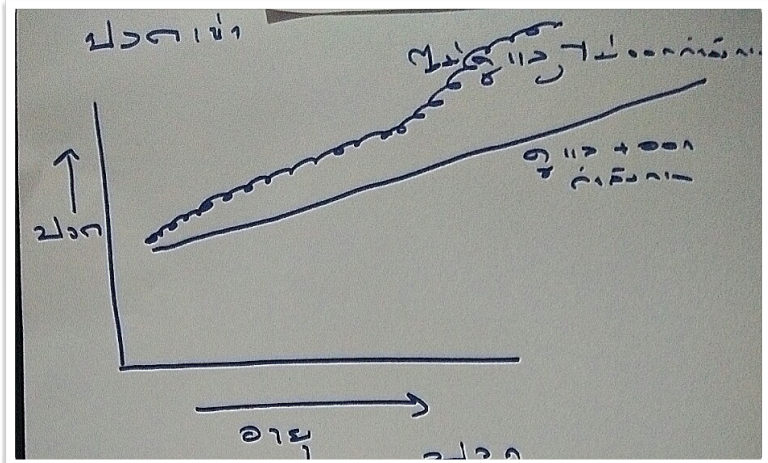
- The *2008 Physical Activity Guidelines for Americans* recommend either 150 minutes per week of moderate activity, 75 minutes of vigorous activity, or a combination of both, for adults.
- Moderate activity is done at a pace where you can carry on a conversation, but cannot "sing". Examples include: *brisk walking, slow biking, water aerobics,* and *general gardening*.
- Vigorous activity is done at a pace where you cannot carry on a conversation and may be out of breath. Examples include: *jogging/running, swimming laps, playing tennis,* and *fast bicycling*.
- Try your best to perform your activity in "bouts" that are at least 10 minutes long (Example – 3 bouts of 10 minutes each day for a total of 30 minutes of activity).

What about strength training?

- The *2008 Physical Activity Guidelines for Americans* also recommend that you do muscle strengthening exercises two times per week to increase bone strength and muscular fitness.
- Adults should perform 8-12 repetitions of activities that work your large muscle groups, such as the legs, hips, abdomen, back, chest, shoulders, and arms.
- These activities do not require going to a gym. You can use resistance bands, do body weight exercises (push-ups, sit-ups, lunges), carry heavy loads, or do heavy gardening or yardwork.

Getting Started

- Doing both aerobic activity (such as walking or jogging) and muscle strengthening is best for your overall health and fitness. If you are just starting out, begin with aerobic exercise.
- If you are not doing 150 minutes a week of aerobic activity, gradually work toward this goal and remember that "some" is better than "none."
- Similar to the aerobic activity, those who are just beginning should gradually increase their strength training slowly and safely over a longer period of time.
- Design your physical activity program so that it fits your schedule.
- Consider working with a local fitness professional to help you safely achieve your goals.
- Most of all have **FUN** and enjoy being physically active!



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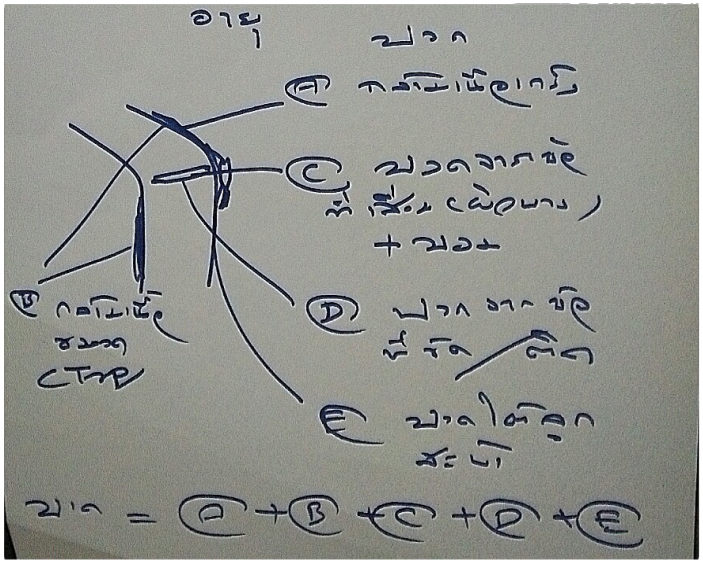

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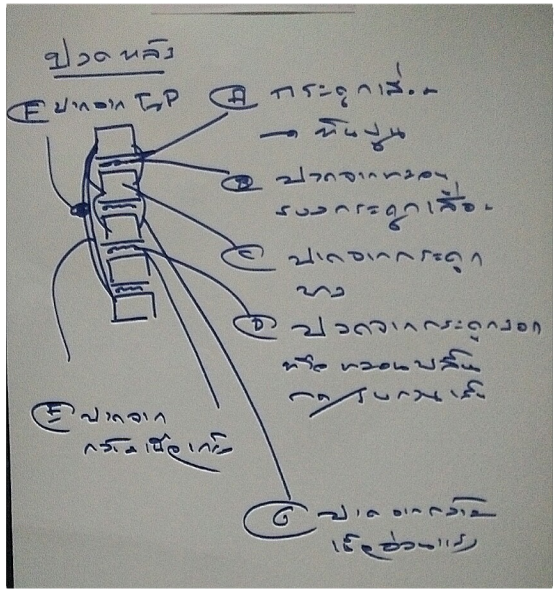

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How the practice?

- Exercise prescription is not difficult now
- The difficult things are
  - initiate first step
  - adherence
  - compliance

TABLE 1. Implementing Prochaska and DiClemente Stages of Change Model for motivating patients to exercise

Stage of change	Goal	Open-ended questions
Precontemplation—*Lacks awareness or intention to exercise*	To help patient begin to consider exercising.	"What are some benefits of exercise for diabetes control?"
Contemplation—*Aware for need to change behavior, intends to begin in next 6 months.*	To encourage patient to start increasing exercise.	"What are your potential barriers for exercise?"
Preparation—*Ready to change in next 30 days and has taken steps to do so.*	To encourage patient to meet ACSM/ADA guidelines for exercise.	"How can we track your goals and what will you do to reward yourself for meeting your goals?"
Action—*Has made change for less than 6 months*	To encourage patient to meet ACSM/ADA goals for exercise for long term.	"What are your potential barriers and how can we strategize to avoid them in the future?"
Maintenance—*Has maintained change for more than 6 months*	To avoid relapse and maintain regular long-term exercise.	"What will you do if you miss exercise due to travel, holidays, or family? How will you get back on track? What are your favorite exercises?"

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Planning

- Separate people according to their stage of change
- Subgroup in Precontemplation stage by healthy problems
- Subgroup other stages by fitness level.

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