Kardiovaskuläre Risikofaktoren

Alter
Geschlecht
Familiäre Belastung

Dyslipidämie
Diabetes mellitus
Übergewicht/vermehrter Bauchumfang
Rauchen
Sedentarität
Ungesunde Ernährung
Distress
Bluthochdruck

nicht
beeinflussbar
Risikofaktoren für Koronare Herzkrankheit und Myokardinfarkt

Figure 1 Percentage of the decrease in deaths from coronary heart disease attributed to treatments and risk factor changes in different populations (adapted from Di Chiara et al.\textsuperscript{31})
Table 4  Guideline recommendations vs. achievements in patients with established coronary heart disease in EUROASPIRE III

<table>
<thead>
<tr>
<th>Guideline recommendations</th>
<th>Proportions at goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking cessation among smokers</td>
<td>48</td>
</tr>
<tr>
<td>Regular physical activity</td>
<td>34</td>
</tr>
<tr>
<td>BMI &lt;25 kg/m²</td>
<td>18</td>
</tr>
<tr>
<td>Waist circumference &lt;94 cm (men)</td>
<td>25</td>
</tr>
<tr>
<td>&lt;80 cm (women)</td>
<td>12</td>
</tr>
<tr>
<td>Blood pressure &lt;140/90 mmHg</td>
<td>50</td>
</tr>
<tr>
<td>Total cholesterol &lt;4.5 mmol/L (175 mg/dL)</td>
<td>49</td>
</tr>
<tr>
<td>LDL cholesterol &lt;2.5 mmol/L (100 mg/dL)</td>
<td>55</td>
</tr>
<tr>
<td>Among patients with type 2 diabetes:</td>
<td></td>
</tr>
<tr>
<td>Fasting glycaemia &lt;7.0 mmol/L (125 mg/dL)</td>
<td>27</td>
</tr>
<tr>
<td>HbA₁c &lt;6.5%</td>
<td>35</td>
</tr>
</tbody>
</table>

BMI = body mass index; HbA₁c = glycated haemoglobin; LDL = low-density lipoprotein.
Rauchen/Nikotin
Cadmium Batteries
Butane Lighter Fluid
Stearic Acid Candle Wax
Hexamine Barbecue Lighter
Toluene Industrial Solvent
Nicotine Insecticide
Acetic Acid Vinegar
Methane Sewer Gas
Arsenic Poison
Carbon Monoxide
Methanol Rocket Fuel
Ammonia Toilet Cleaner
Es gibt keine „sichere“ Art der Tabak Anwendung

Teo KK et al, Lancet 2006
Es gibt kein sicheres Mass, aber eine Reduktion der Zig./Tag reduziert das Risiko

« Pitfalls » im Rahmen der Nikotinentwöhnung

- Entzugssyndrom:
  - Abhängigkeit und Nikotinentzug erklären, Nikotinersatz anbieten

- Rückfall/Rückfälle und Scheitern:
  - Durchschnittlich 5 Versuche, um Ex-RaucherIn zu werden, «Lernprozess»

- Stress:
  - Günstigen Moment wählen (keine Krise, aber auch nicht hinausschieben!)
  - Zur Stressbewältigung: Entspannung, körperliche Betätigung

- Rauchende im Umfeld:
  - Nichtraucherbereiche benutzen; lernen, angebotene „Zigi“ abzulehnen

- Gewichtszunahme: *(Folge aus Entzugs und Kompensation durch Essen)*
  - Gewichtszunahme bei Rauchstopp: 80% der Fälle
  - Durchschnittlich 4-5 kg Zunahme nach 12 Monaten
  - Größte Gewichtszunahme innerhalb ersten 3 Monaten
Stress, psychosoziales Umfeld
| Core questions for the assessment of psychosocial risk factors in clinical practice |
|---------------------------------|--------------------------------------------------------------------------------|
| **Low socio-economic status**   | What is your highest educational degree?                                      |
|                                 | Are you a manual worker?                                                      |
| **Work and family stress**      | Do you lack control over how to meet the demands at work?                     |
|                                 | Is your reward inappropriate for your effort?                                 |
|                                 | Do you have serious problems with your spouse?                               |
| **Social isolation**            | Are you living alone?                                                         |
|                                 | Do you lack a close confidant?                                                |
| **Depression**                  | Do you feel down, depressed, and hopeless?                                    |
|                                 | Have you lost interest and pleasure in life?                                  |
| **Anxiety**                     | Do you frequently feel nervous, anxious, or on edge?                          |
|                                 | Are you frequently unable to stop or control worrying?                        |
| **Hostility**                   | Do you frequently feel angry over little things?                              |
|                                 | Do you often feel annoyed about other people’s habits?                        |
| **Type D personality**          | In general, do you often feel anxious, irritable, or depressed?               |
|                                 | Do you avoid sharing your thoughts and feelings with other people?            |
acute coronary syndromes have been attributed to

- acute and chronic emotional distress
- stressful life events
- disasters such as earthquakes

In addition, studies have found that

- personality
- depression
- anxiety
- anger

were risk factors for cardiovascular disease
Broken Heart: A Statistical Study of Increased Mortality among Widowers

C. MURRAY PARKES,* M.D., D.P.M.; B. BENJAMIN,† Ph.D., F.I.A.; R. G. FITZGERALD,‡ M.D.


Table I.—Cause of Death Among the 213 Widowers Who Died Within Six Months of Their Wives Compared With the Number Expected from the Mortality Rate of Married Males of the Same Age in England and Wales During 1957

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>No. of Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
</tr>
<tr>
<td>Coronary thrombosis and other arteriosclerotic and degenerative heart disease</td>
<td>77</td>
</tr>
<tr>
<td>Influenza, pneumonia, and bronchitis</td>
<td>29</td>
</tr>
<tr>
<td>Other heart and circulatory disease</td>
<td>24</td>
</tr>
<tr>
<td>Vascular lesions affecting C.N.S.</td>
<td>22</td>
</tr>
<tr>
<td>Cancer of other sites</td>
<td>22</td>
</tr>
<tr>
<td>Cancer of lung and bronchus</td>
<td>8</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>4</td>
</tr>
<tr>
<td>Other causes</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
</tr>
</tbody>
</table>

Trichopoulos D, Katsouyanni K, Zavitsanos X, Tzonou A, Dalla-Vorgia P.

Abstract
The effects of acute and subacute psychological stress caused by a sudden general disaster on mortality from atherosclerotic heart disease (underlying cause) and cardiac events (proximate cause) were investigated by comparing total and cause-specific mortality during the days after a major earthquake in Athens in 1981 with the mortality during the surrounding month and the corresponding periods of 1980 and 1982. There was an excess of deaths from cardiac and external causes on the days after the major earthquake, but no excess of deaths from cancer and little, if any, excess of deaths from other causes. The excess mortality was more evident when atherosclerotic heart disease was considered as the underlying cause (5, 7, and 8 deaths on the first three days, respectively; background mean deaths per day 2.6; upper 95th centile 5) than when cardiac events in general were considered as the proximate cause (9, 11, and 14 deaths on the first three days, respectively; background mean 7.1, upper 95th centile 12).
Figure 1. Daily Cardiovascular Events in the Study Population from May 1 to July 31 in 2003, 2005, and 2006.

The FIFA World Cup 2006 in Germany started on June 9, 2006, and ended on July 9, 2006. The 2006 World Cup matches with German participation are indicated by numbers 1 through 7: match 1, Germany versus Costa Rica; match 2, Germany versus Poland; match 3, Germany versus Ecuador; match 4, Germany versus Sweden; match 5, Germany versus Argentina; match 6, Germany versus Italy; and match 7, Germany versus Portugal (for third-place standing). Match 8 was the final match, Italy versus France.
• Major depression **develops in almost 20 percent of patients** after MI, while over 33 percent have significant symptoms of depression soon after an MI.

• Depression is associated with poor compliance with recommendations for post-MI therapy.

• **Spontaneous remission of depressive symptoms occurs in approximately one-half of cases of post-MI depression**; the other cases either persist or remit and relapse within one year.

• This suggests that a substantial number of patients may benefit from treatment of depression following an MI.
Gesunde Ernährung
Figure 8  Cumulative 25-year coronary heart disease (CHD) mortality rates in different cohorts of the Seven Countries Study, according to baseline quartiles of total cholesterol level, adjusted for age, smoking, and blood pressure.\textsuperscript{304}
in cardiovascular risk remained (Figure 8). The diet consumed in the Mediterranean cohorts of the Seven Countries Study is probably an important factor underlying the large difference in CVD rates between southern and northern Europe.

The concept of the Mediterranean diet comprises many of the nutrients and foods that have been discussed previously: a high intake of fruits, vegetables, legumes, wholegrain products, fish, and unsaturated fatty acids (especially olive oil), a moderate consumption of alcohol (mostly wine, preferably consumed with meals), and a low consumption of (red) meat, dairy products, and saturated fatty acids.
Possible Consensus on Nutrition Recommendations:

1. Eat "WHOLE foods" and avoid "PROCESSED foods"
2. If insulin resistant: avoid sugars and starchy foods
3. "Fat is your Friend" (olive oil, nuts, dairy products, fish)
4. Meat, eggs and full-fat dairy products are "o.k."
Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study.

Dehghan M1,2,4, Wolever T2, Zhang X1,2,3, Swaminathan B2,4, Li W1,4, Mohan V1,4, Iqbal R2,4, Kumar R2,4, Werz-Schiersch F2, Rosnereen A2,4, Amma Li1,4, Aveam A1,2, Chittamba J1,2, Diao R1,2, Khodr RI,2, Kear S1,2, Lopez-Jaramillo P1,2, Liu X1,4, Gupta R1,2, Mohamadifar N1,4, Gao M1,4, Duaq A1,2, Rami AS1,2, Seron P2,3, Sun Y1,4, Spah D1,2, Teodolo LA, World P2,2, Youssef RA1,2, Rustan Yousufu A2,4, Tien KH1, Ranganathan S1,2, Dagenais G2, Rangwala Si1,2, Islam S1,4, Anand SS1,2, Yousuf S2,3, Prospective Urban Rural Epidemiology (PURE) study investigators.

Collaborators (326)

Author information

Abstract

BACKGROUND: The relationship between macronutrients and cardiovascular disease and mortality is controversial. Most available data are from European and North American populations where nutrition excess is more likely, so their applicability to other populations is unclear.

METHODS: The Prospective Urban Rural Epidemiology (PURE) study is a large, epidemiological cohort study of individuals aged 35-70 years (enrolled between Jan 1, 2003, and March 31, 2013) in 18 countries with a median follow-up of 7-4 years (IQR 5-3-9-3). Dietary intake of 136,335 individuals was recorded using validated food frequency questionnaires. The primary outcomes were total mortality and major cardiovascular events (fatal cardiovascular disease, non-fatal myocardial infarction, stroke, and heart failure). Secondary outcomes were all myocardial infarctions, stroke, cardiovascular disease mortality, and non-cardiovascular disease mortality. Participants were categorised into quintiles of nutrient intake (carbohydrate, fats, and protein) based on percentage of energy provided by nutrients. We assessed the associations between consumption of carbohydrate, total fat, and each type of fat with cardiovascular disease and total mortality. We calculated hazard ratios (HRs) using a multivariable Cox frailty model with random intercepts to account for centre clustering.

FINDINGS: During follow-up, we documented 57,966 deaths and 47,845 major cardiovascular disease events. Higher carbohydrate intake was associated with an increased risk of total mortality (highest quintile [quintile 5] vs lowest quintile [quintile 1] category, HR 1.28 [95% CI 1.12-1.46]). Pnon-HR < 0.001) but not with the risk of cardiovascular disease or cardiovascular disease mortality. Intake of total fat and each type of fat was associated with lower risk of total mortality (quintile 5 vs quintile 1, total fat HR 0.77 [95% CI 0.67-0.87], Pnon-HR = 0.001; saturated fat, HR 0.96 [97-0.97]; Pnon-HR = 0.008; monounsaturated fat, HR 0.97 [0.71-1.02]; Pnon-HR = 0.001; and polyunsaturated fat, HR 1.11 [0.71-1.69]; Pnon-HR = 0.048). Higher saturated fat intake was associated with lower risk of stroke (quintile 5 vs quintile 1, HR 0.78 [95% CI 0.64-0.80], Pnon-HR = 0.048). Total fat and saturated and unsaturated fats were not significantly associated with risk of myocardial infarction or cardiovascular disease mortality.

INTERPRETATION: High carbohydrate intake was associated with higher risk of total mortality, whereas total fat and individual types of fat were related to lower total mortality. Total fat and types of fat were not associated with cardiovascular disease, myocardial infarction, or cardiovascular disease mortality, whereas saturated fat had an inverse association with stroke. Global dietary guidelines should be reconsidered in light of these findings.

FUNDING: Full funding sources listed at the end of the paper (see Acknowledgments).

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(Pre-)Diabetic Dyslipoproteinemia and non-HDL-Cholesterol

Lipoprotein Subclasses

- VLDL
- IDL
- LDL
- Chylomicron Remnants
- non-HDL-Cholesterol

Density (g/ml)
- 0.95
- 1.006
- 1.02
- 1.06
- 1.10
- 1.20

Diameter (nm)
- 5
- 10
- 20
- 60
- 80
- 1000

Apo B
Non-HDL-C, ApoB and Triglycerides all improved with

1. LESS CARBS (sugars, starchy foods)

2. MORE FAT, preferably MUFA and SFA (sic!)

Compared to high GI-Carbs, SFA from dairy are BENEFICIAL.
There can be no „One Size Fits All“-Diet !!!

Individualize nutrition recommendations according to:

- personal and cultural preferences
- degree of metabolic problems (insulin resistance)
- level of daily physical activity
<table>
<thead>
<tr>
<th>Med. intake</th>
<th>Unprocessed red meat &amp; poultry intake, servings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 1 per week</td>
</tr>
<tr>
<td>N</td>
<td>18179</td>
</tr>
<tr>
<td>Total deaths</td>
<td>1.0</td>
</tr>
<tr>
<td>Major CVD</td>
<td>1.0</td>
</tr>
<tr>
<td>MI</td>
<td>1.0</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.0</td>
</tr>
<tr>
<td>CVD dth</td>
<td>1.0</td>
</tr>
<tr>
<td>Non CVD death</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Adjusted for age, sex, center, WHR, energy, education, smoking, activity, urban/rural, diabetes, cancer, use of statin and BP meds
Association of Fish Intake with the Risk of Major CVD

<table>
<thead>
<tr>
<th>Study</th>
<th>HR (95% CI)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>PURE (Without Prior CVD)</td>
<td>0.93 (0.85, 1.02)</td>
<td>36.50</td>
</tr>
<tr>
<td>PURE (With Prior CVD)</td>
<td>0.84 (0.69, 1.02)</td>
<td>9.69</td>
</tr>
<tr>
<td>ONTARGET/TRANSCEEND</td>
<td>0.91 (0.84, 0.98)</td>
<td>53.82</td>
</tr>
<tr>
<td>Overall</td>
<td>0.91 (0.86, 0.96)</td>
<td>100.00</td>
</tr>
</tbody>
</table>
• Refined grains & diets with high GI associated with higher mortality and CVD. Whole grains neutral. Fruits and legumes associated with lower risk

• Higher meat, poultry & fish intake have modest protective associations with mortality and perhaps stroke

• Previous publications (PURE and others) indicate that higher dairy (milk, cheese, butter and yoghurt) is associated with lower CVD, deaths (Lancet 2018), lower BP & diabetes (In review Lancet D & E).
- Saturated fatty acids to account for <10% of total energy intake, through replacement by polyunsaturated fatty acids.

- Trans-unsaturated fatty acids: as little as possible, preferably no intake from processed food, and <1% of total energy intake from natural origin.

- <5 g of salt per day.

- 30–45 g of fibre per day, from wholegrain products, fruits, and vegetables.

- 200 g of fruit per day (2–3 servings).

- 200 g of vegetables per day (2–3 servings).

- Fish at least twice a week, one of which to be oily fish.

- Consumption of alcoholic beverages should be limited to two glasses per day (20 g/day of alcohol) for men and one glass per day (10 g/day of alcohol) for women.
Lean, metabolically healthy and active

Your Earned Extra-Carbs

Fruit Juices, Soft Drinks
Diet Sodas, Fruit Smoothies
Wellness Water, Fruit Spritzers
Vegetable Juice
Black/Green Tea, Coffee
Water, Fruit and Herbal Tea
Cholesterolin

- Phospholipid (PL)
- Protein Cholesteryl ester (CE)
- Triglycerides (TG)

Chylomicron

Size (Å): 750-12000

VLDL: 300-800
IDL: 250-350
LDL: 180-250
HDL: 50-120

Activated protein C, Protein S
Factor X → Factor Xa

Monocyte

LDL

HDL

NO, PGI2, CNP

Cytokines, chemokines

Platelets

SMCs

Endothelium

LDL

Ox LDL

HDL

Macrophage

Foam cell
State of the Art: Behandlung mit Statinen zeigt direkte Beziehung zwischen LDL-C Senkung und kardiovaskulärer Ereignisrate.

Statin-Nebenwirkungen - Signifikanz und Definitionen

Myalgie

Myopathie/Myositis

Rhabdomyolyse

- Häufig (auch unter Placebo)!
  - 1 - 25%

- Selten (1 : 10'000)
  - CK > 3-10 x Normwert

- Selten (0.1 : 1’000 pro 5 Jahre)
  - 1.5 Todesfälle pro 1 Mio
Blutdruck
High blood pressure is greater than 140/90 Systole Diastole

Force on arteries causing damage

Force of heart pumping causing strain

Heart at rest
High Blood Pressure

High blood pressure is a sign that the heart and blood vessels are being overworked.

Untreated, the disease can lead to atherosclerosis and congestive heart failure.
Main complications of persistent high blood pressure

Brain:
- Cerebrovascular accident (strokes)
- Hypertensive encephalopathy:
  - confusion
  - headache
  - convulsion

Retina of eye:
- Hypertensive retinopathy

Heart:
- Myocardial infarction (heart attack)
- Hypertensive cardiomyopathy:
  - heart failure

Blood:
- Elevated sugar levels

Kidneys:
- Hypertensive nephropathy:
  - chronic renal failure
**Table 14** Blood pressure thresholds for definition of hypertension with different types of blood pressure measurement

<table>
<thead>
<tr>
<th></th>
<th>SBP (mmHg)</th>
<th>DBP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office or clinic</td>
<td>140</td>
<td>90</td>
</tr>
<tr>
<td>24-hour</td>
<td>125–130</td>
<td>80</td>
</tr>
<tr>
<td>Day</td>
<td>130–135</td>
<td>85</td>
</tr>
<tr>
<td>Night</td>
<td>120</td>
<td>70</td>
</tr>
<tr>
<td>Home</td>
<td>130–135</td>
<td>85</td>
</tr>
</tbody>
</table>

BP = blood pressure; DPB = diastolic blood pressure; SBP = systolic blood pressure.
Diabetes

Diabetic Retinopathy
Leading cause of blindness in adults

Diabetic Nephropathy
Leading cause of end-stage renal disease

Stroke
2- to 4-fold increase in cardiovascular mortality and stroke

8/10 individuals with diabetes die from CV events

Diabetic Neuropathy
Diabetes mellitus – Medikamente und sonstige Substanzen

Verdoppelung des cv Risikos bei DM

- Multifaktorieller Ansatz der Prävention:
  - Glucose-Kontrolle
    \textit{first-line: Metformin}
    (Empagliflozin 38\% Reduktion cv Tod: Nur in Sekundärprophylaxe)
  
  cave intensive BZ-Senkung (Ältere Patienten, KHK)

- Lipidsenkung
  - Statine generell empfohlen ab 40 Jahren (Simvastatin? PSCK9-Inh.?)

- Blutdrucksenkung
  - ACE-Hemmer im Vordergrund
    - Zielwerte: <140/85mmHg bzw. 150/90mmHg)

- Lifestyle Management


\textit{N Engl J Med} 2008;358:2545-59 (ACCORD)
### Recommendations on diabetes mellitus

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>GRADE</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>The target HbA1c for the prevention of CVD in diabetes of &lt;7.0% (&lt;53 mmol/mol) is recommended.</td>
<td>I</td>
<td>A</td>
<td>Strong</td>
<td>434, 435</td>
</tr>
<tr>
<td>Statins are recommended to reduce cardiovascular risk in diabetes.</td>
<td>I</td>
<td>A</td>
<td>Strong</td>
<td>166, 436</td>
</tr>
<tr>
<td>Hypoglycaemia and excessive weight gain must be avoided and individual approaches (both targets and drug choices) may be necessary in patients with complex disease.</td>
<td>I</td>
<td>B</td>
<td>Strong</td>
<td>435, 437, 438</td>
</tr>
<tr>
<td>Metformin should be used as first-line therapy if tolerated and not contraindicated.</td>
<td>IIa</td>
<td>B</td>
<td>Strong</td>
<td>439</td>
</tr>
<tr>
<td>Further reductions in HbA1c to a target of &lt;6.5% (&lt;48 mmol/mol) (the lowest possible safely reached HbA1c) may be useful at diagnosis. For patients with a long duration of diabetes this target may reduce risk of microvascular outcomes.</td>
<td>IIb</td>
<td>B</td>
<td>Weak</td>
<td>435</td>
</tr>
<tr>
<td>BP targets in diabetes are recommend to be &lt;140/80 mmHg.</td>
<td>I</td>
<td>A</td>
<td>Strong</td>
<td>440, 441</td>
</tr>
<tr>
<td>Target LDL cholesterol is &lt;2.5 mmol/L, for patients without atherosclerotic disease total cholesterol may be &lt;4.5 mmol/L, with a lower LDL cholesterol target of &lt;1.8 mmol/L (using higher doses of statins) for diabetic patients at very high CVD risk.</td>
<td>IIb</td>
<td>B</td>
<td>Weak</td>
<td>442</td>
</tr>
<tr>
<td>Antiplaletet therapy with aspirin is not recommended for people with diabetes who do not have clinical evidence of atherosclerotic disease.</td>
<td>III</td>
<td>A</td>
<td>Strong</td>
<td>443</td>
</tr>
</tbody>
</table>

ACS = acute coronary syndrome; BP = blood pressure; CKD = chronic kidney disease; CVD = cardiovascular disease; HbA1c = glycated haemoglobin; LDL = low-density lipoprotein.

*Class of recommendation.

*Level of evidence.

*References.
Globale Unterschiede (INTERHEART Studie)

Hauptrisikofaktoren (in allen Regionen)
Nikotin, Cholesterin und Stress

„High Income Countries“ „Abdominal Obesity“ wichtigerer Risikofaktor als Nikotin!

Apfelform
Der Bauchumfang als unabhängiger (und bedeutender) Risikofaktor

Männer <94-102cm
Frauen <80-88cm

Die Korrelation zwischen Body Mass Index und Mortalität

Mortalität

Body Mass Index (kg/(m)^2)

leicht erhöhtes Risiko

erhöhtes Risiko
Komplikationen der Adipositas

→ Hypertonie
→ Diabetes mellitus Typ II
→ Dyslipidämie
→ Unabhängiger kardiovaskulärer Risikofaktor (Apfelform!)
→ Arthrose
→ Schlafapnoe-Syndrom
→ **Metabolisches Syndrom**
Gewichtsreduktion von 10 kg...

Risikoreduktion:
• Mortalität: 20%
• Diabetes: 30%
• Krebs: 40%

Risikofaktoren:
• BD systol.: -10 mmHg
• BD diastol.: -20 mmHg
• Blutzucker: -50%
• T-Cholesterin: -10%
• LDL-Cholesterin: -15%
• HDL-Cholesterin: +8%
• Triglyzeride: -30%
Körperliche Aktivität
## Recommendations regarding physical activity

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>GRADE</th>
<th>Ref¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy adults of all ages should spend 2.5–5 h a week on physical activity or aerobic exercise training of at least moderate intensity, or 1–2.5 h a week on vigorous intense exercise. Sedentary subjects should be strongly encouraged to start light-intensity exercise programmes.</td>
<td>I</td>
<td>A</td>
<td>Strong</td>
<td>305–308</td>
</tr>
<tr>
<td>Physical activity/aerobic exercise training should be performed in multiple bouts each lasting ≥10 min and evenly spread throughout the week, i.e. on 4–5 days a week.</td>
<td>IIA</td>
<td>A</td>
<td>Strong</td>
<td>305–308</td>
</tr>
<tr>
<td>Patients with previous acute myocardial infarction, CABG, PCI, stable angina pectoris, or stable chronic heart failure should undergo moderate- to vigorous intensity aerobic exercise training ≥3 times a week and 30 min per session. Sedentary patients should be strongly encouraged to start light-intensity exercise programmes after adequate exercise-related risk stratification.</td>
<td>I</td>
<td>A</td>
<td>Strong</td>
<td>309, 310</td>
</tr>
</tbody>
</table>

CABG = coronary artery bypass graft; PCI = percutaneous coronary intervention.

¹Class of recommendation.

²Level of recommendation.

³Level of evidence.

⁴References.
## Benefits of regular physical activity

<table>
<thead>
<tr>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduces the risk of dying prematurely</td>
</tr>
<tr>
<td>Reduces the risk of dying from heart disease</td>
</tr>
<tr>
<td>Reduces the risk of stroke</td>
</tr>
<tr>
<td>Reduces the risk of developing diabetes</td>
</tr>
<tr>
<td>Reduces the risk of developing high blood pressure</td>
</tr>
<tr>
<td>Helps reduce blood pressure in people who already have high blood pressure</td>
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<tr>
<td>Reduces the risk of developing colon cancer</td>
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<tr>
<td>Reduces feelings of depression and anxiety</td>
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<tr>
<td>Helps control weight</td>
</tr>
<tr>
<td>Helps build and maintain healthy bones, muscles, and joints</td>
</tr>
<tr>
<td>Helps older adults become stronger and better able to move about without falling</td>
</tr>
<tr>
<td>Promotes psychological wellbeing</td>
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</tbody>
</table>
The risk of dying prematurely declines as people become physically active.

Beneficial effects of any physical activity on coronary heart disease

Coronary events are less frequent among those who exercise. In a study of 5159 men, aged 40 to 49 years, followed for an average of almost 19 years, the age-adjusted coronary heart disease event rate per 1000 person-years is lower in those who perform any physical activity compared with inactive subjects.