Exercise and diet in the maintenance of health

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Exercise: General References

Exercise: Additional refs not listed on slides:
- Obesity
  • Swinburn and Egger 2002 Obesity rev 3: 289-301
  • Blood pressure/heart
  • Kelly and Kelley 2000 Hypertension 35: 838-843
  • Barlow et al 2006 Am J Epidemiol 163: 142-150
  • www.heartfoundation.com.au
  • www.cancer.org.au
- Cancer
  • Lee 2003 Med Sci Sports Ex 35: 1823-1827
  • Magnusson et al 2005 Br J Cancer 93: 817-824
  • Wannamethee et al 2001 Br J Cancer 85: 1311-1316
  • Colditz et al 2003 Br J Cancer 89: 847-851
  • www.cancer.org.au

Nutrition references
- Nutrition on the net
  • www.eis.org.au
  • www.glycemicindex.com
  • www.healthyeating.org
  • www.sportsdietitians.com
  • www.heartfoundation.com.au
  • www.nutritionaustralia.org

Lecture outline
- Health: What is it?
- Exercise: the association with health maintenance
- Exercise: How much is required for health maintenance? Dose-response relationship
- Diet and health maintenance

Health
- A state of optimal physical, mental, and social well-being, and not merely the absence of disease and infirmity
  • DORLAND'S ILLUSTRATED MEDICAL DICTIONARY
Exercise

• Physical activity: A bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure

• Exercise: A type of physical activity, a type of planned, structured and repetitive bodily movement done to improve or maintain one or more components of physical fitness

Health related components of fitness

• Associated with ability to perform daily activities with vigor, and possession of traits and capacities associated with low risk of premature development of disease

• Cardiovascular endurance

• Muscular strength and endurance

• Flexibility

• Body composition

Exercise: the “multi-pill”

• Reduces the risk of: (Nb. This list is not exhaustive)

  • Coronary artery disease
  • Hypertension
  • Stroke
  • Diabetes (Type II)
  • Obesity
  • Depression
  • Cancer (breast and colon)
  • Osteoporosis

Physical inactivity is estimated to cause 1.9 million deaths worldwide annually

• (World Health Organisation Report, 2002)

Physical inactivity adds to the risks already associated with other risk factors

↓ risk of coronary artery disease with exercise
Bauman 2003 J Sci Med Sport 7: (2) Suppl. 6-19

↓ risk of hypertension with exercise
↓ risk of stroke with exercise

Hu et al 2000 JAMA 283: 2961-2967

↑ HDL, ↓ TC/HDL ratio with exercise

↑ risk of diabetes Type II with less exercise
Hu et al 2001 Arch Intern Med 161: 1542-1548

↓ risk of obesity with exercise
Erlichman et al 2002 Obesity Reviews 3: 273-287
↓ risk of obesity with exercise

- Abdominal obesity
- Higher body weight and fitter vs. lean and less fit (Tzar Comp Med 2005 (Nov/Dec) 53-57)

↓ risk of cancer with exercise


↓ risk of depression with exercise

- Fox 1999 Public Health Nutr 2(3a) 411-418
- Aerobic and resistance exercise ↓ anxiety, stress, depression
- High activity ↓28% risk depression, moderate activity ↓17%, compared with low activity (Mellings et al 1994 Acta Psychiatr Scand 89 (1377) 16-22)
- Twice the risk of clinical depression in non exercisers (Tisser et al 1990 Am J Med 2 Suppl 108:

↓ risk of osteoporosis

- Physical activity in youth ↑ bone mass
- Physical activity in adulthood ↓ bone loss
- Endurance aerobic, resistance, impact
- Non impact has less of an impact!
- Caution: balance required, too much exercise ↓ oestrogen = osteopenia

Low abdominal muscular endurance associated with ↑ risk mortality


It’s never too late
4 major domains for physical activity

- At work (regardless of manual labour)
- Transport (walking, cycling to work, shops etc.)
- Domestic duties
- Leisure time (sports and recreational activities)

How much exercise is required for health maintenance?


- Benefits obtained at low-moderate levels of physical activity
  - Training at high intensity does not appear to provide additional benefit for:
    - Blood pressure reduction @ 50% maximal exercise tolerance

(B) Linear relationship between exercise and health benefit

- Linear increase in exercise level results in a linear reduction in the risk of:
  - Coronary heart disease
  - Diabetes Type II
  - Breast cancer (need more research)
  - Colon cancer (need more research)
  - Depression

(C) Benefits obtained at moderate-high levels of physical activity

- Need high intensity, more vigorous exercise to achieve the following:
  - Blood lipids: average ↑ of 4.6% in HDL
  - Prevention of weight gain
  - Weight loss
  - Caution: Risk of injury (musculoskeletal)
Current exercise recommendations for health maintenance (WHO, 2004)

- Engage in adequate levels throughout lives
- Different types and amounts required for different health outcomes
- At least 30 min of aerobic, moderate-intensity on most days ↓ risk of cardiovascular disease, diabetes, breast and colon cancers
- Muscle strengthening and balance training can ↓ falls and ↑ functional status among older adults

Current diet recommendations for health maintenance (WHO, 2004)

- Achieve energy balance and healthy weight
- Limit total fat consumption, decrease saturated and trans fat
- Increase fruit/vegetable, legume, whole grain and nuts consumption
- Limit intake of free sugars
- Limit sodium (salt) consumption

Carbohydrate

- High G.I: Calrose rice, wholemeal and white breads, potato;
- Low G.I: pasta, All bran cereal, sweet potato, grain breads, high fibre
- Total Glycemic load per meal is important
- For health:
  - Low G.I promotes slower digestion (↑ satiety, ↓ obesity, heart disease, plasma cholesterol), ↓ insulin resistance (diabetes), ↓ constipation (cancers: oral cavity, oesophagus, larynx, stomach, colon)
  - RDI: 4.5g/kg body mass, eg. 1 cup cooked rice, pasta, noodles = 180 g, 2 slices bread = 60 g
- Hints: Regularly use pasta, rice, couscous, eat wholegrain non-refined breakfast cereals daily, cakes and pastries are occasional treats only

Fat

- Excessive fat intake (especially saturated fat) contributes to heart, CV disease (↑ LDL), diabetes (↑GLUT 4), obesity.
- RDI: Limit to 30-50g daily.
- Hints:
  - Use mono- or poly- unsaturated oils (vegetable sunflower, canola) rather than saturated butter, lard, palm or coconut oil
  - Limit trans fat (margarine, frozen products)
  - Select low fat food varieties (eg. Milk)
  - ↑ fish consumption (polyunsaturated omega-3 fatty acids)
  - Buy lean cuts of meat and trim skin and visible fat.
  - Limit sausage, fatty mince, processed meat, luncheon meat
  - Limit hidden fats in pastries, cakes, biscuits, cheese, sauces
  - HDL: nuts, avocado (sparingly)
  - In cooking, stir fry, steam and boil rather than deep fry

Protein

- Meats and meat alternatives, fish, poultry, eggs, nuts
- For health:
  - Red meat for haem iron (oxygen transport
  - Omega-3 fatty acids may ↓ heart disease
  - Protein for cell, antibody, enzyme and hormone production
  - Zinc for protein and insulin synthesis
  - Vitamin B-12 for DNA synthesis, nerve conduction.
  - RDI: 1 serve daily. Eg. 65-100 g cooked meat or chicken, or 2 slices roast meat, or 2 small eggs, or half a cup of peanuts;
  - Protein intake: For health 0.75g/kg, For sport: 1.4 g/kg (endurance athlete); 2.5 g/kg (strength athlete)
- Hints:
  - Co-consume vitamin C rich foods or drink with meat to ↑ iron absorption (iron absorption inhibitors: tea, coffee, red wine)
The Daily Telegraph
Monday January 9, 2006

Dairy

- Milk, yoghurt, cheese, and dairy alternatives (soy, tofu, sardines, almonds and spinach)
- For health: main benefit is calcium intake and the prevention of osteoporosis
- For sport: ↓ risk of stress fractures
- RDI: 2-4 serves daily of either: a cup (250ml) milk, or 2 slices (40g) cheese, 1 carton (200ml) yoghurt, half a cup of pink salmon (with bones), a cup of almonds

Fruit & vegetables, legumes

- For health: May ↓ coronary heart disease, stroke, hypertension, Type 2 diabetes, cataracts and macular degeneration of the eye, cancers (oral cavity, esophagus, stomach, bowel, lung, breast, pancreas, obesity.
- Contain many vitamins (C and E), minerals (potassium and magnesium), phytochemicals
- RDI: 2 fruit, 5 vegetables daily
- Hints:
  - Wash well to remove surface bacteria
  - Don't soak in water
  - Don't overcook (exception: carotenoids are absorbed better from cooked tomatoes)
  - Use fresh where possible, however frozen vegetables also contain adequate nutrients

Alcohol

- Beneficial in atherosclerosis (antioxidant resveratrol ↓ oxLDL) ↓ 2 std drinks per day (f), 2-4 std drinks/day (m)
- ↑ HDL
- ↑ risk of cancer (mouth, g.i.tract, liver), with any alcohol consumption of > 1 std drink/day
- ↑ 24 hr systolic/diastolic blood pressure with > 1 std drink/day (caution for those at risk for hypertension)

Water

- Dehydration of as little as 2% impairs physical and mental performance
- Urinary stone disease, kidney damage, cancer (breast, colon, bladder), impairment of salivary gland function, ↑ risk of heart mitral valve damage
- RDI: Drink at least 8 glasses of water daily (with balance)
- Water is best if exercising for less than 60 minutes: 250 ml/15 min

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