Healthy Ageing – The Role of Nutrition and Lifestyle

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www.nutrition.org.uk

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An ageing population

• For the first time there are more people over the age of 60 than under 16 (2001 census)

• Average life expectancy has been increasing by ~2y per decade (10 years over 50 years)

• Around 16% of the UK population is aged over 65 years (13% in 1971) and the proportion is increasing rapidly

• The greatest increase is in those over the age of 85 - this reached 1.2 million people in 2005

• These demographic changes pose many challenges for society and our health care systems
Trends in ‘healthy’ ageing

Table 1. Trends in life expectancy and healthy life expectancy at birth, 1981 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy</td>
<td>76.8</td>
<td>80.4</td>
</tr>
<tr>
<td>General HLE</td>
<td>66.7</td>
<td>68.8</td>
</tr>
<tr>
<td>% life in ‘good’ or ‘fairly good’ health</td>
<td>86.9%</td>
<td>85.6%</td>
</tr>
</tbody>
</table>

Source: www.statistics.gov.uk
# Increasing obesity

**Impact** | **Health outcome**
--- | ---
RR > 3 | Type 2 diabetes; hypertension; dyslipidaemia; breathlessness; sleep apnoea
RR 2-3 | CHD; complications of pregnancy; osteoarthritis; hyperuricaemia & gout
RR 1-2 | Certain cancers; impaired fertility & PCOS; lower back pain; foetal defects

**Fig 3.5** Prevalence of obesity by sex, adults aged 16-64 years, 1995-2004, England and Scotland

Source: BHF 2006; DH 2006
Effects of ageing - 1

- Increased risk of chronic disease, cognitive impairment and dementia, arthritis
- Activity level *usually* declines
- Decline in lean body mass (muscle) and BMR
- Reduction in bone density (especially in women)
  - increased risk of fractures
- Impaired dentition
- Impairments in digestive function (e.g. gastric acid and digestive enzymes) can lead to reduced nutrient bioavailability
Effects of ageing - 2

- Skin changes (less vitamin D produced)
- Changes in taste perception (by age 74-85 the number of taste buds falls by 65% and sensitivity to salty and bitter tastes decrease)
- Changes in sense of smell can reduce pleasure of eating
- Eyesight & arthritis may make food preparation difficult
- Psychosocial factors may also exert a substantial effect on food choice and intake, and hence nutritional status

→ All may influence nutritional status
Benefits of a healthy diet

• Protection against chronic diseases

• Preservation of immune function, digestive health, functional ability, bone health, oral health, vision (for example)

• Benefits for cognitive function, mental health, wellbeing

• Minimises risk of weight loss, under-nutrition, low nutrient status, deficiency diseases (e.g. anaemia)

• Aids recovery from illness.
Need for good hydration

• Important for all

• Ensuring that older people are well hydrated is essential

• Dehydration, by as little as 2% loss of body weight, results in impaired physiological and performance responses

• In extreme cases, mental confusion that has been interpreted as the onset of senility, has been reversed by adequate hydration
Benefits of physical activity

• Important for the maintenance of mobility and independent living
  – Improving strength, balance and co-ordination is highly effective in reducing the risk of falls

• Helps prevent CVD, type 2 diabetes, obesity and some types of cancer

• Benefits bone, joint and digestive health

• Improves mental wellbeing and can help prevent depression. Also associated with reduced risk of cognitive decline

• Older people should aim to achieve 5 x 30 minutes of moderate intensity activity per week
  – include activities to improve strength & balance e.g. dancing, yoga, taichi

• Only 18% of males and 14% of females aged 65-74 years achieve this (HSE 2004)
Summary of findings for other organ systems
Eye health

- 1 in 4 over age 85 are visually impaired
- 50% of visual impairment in older people is due to treatable conditions
  - cataract, refractive error, diabetic retinopathy
- Risk factors: smoking, also high exposure to sunlight, and obesity
- Studies suggest **dietary** antioxidants (vitamin C, lutein, zeaxanthein) may help protect against cataract and AMD
- Evidence less robust, but it is likely that consuming at least 1 portion of oily fish/week will reduce risk of AMD
- No evidence from trials to support use of **supplements** in prevention of eye disease

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Digestive System - cancer

- **Upper GI**: smoking, high alcohol intake & obesity ↑ risk of cancer. High fruit /veg (especially those rich in vitamin C or beta-carotene and allium veg) offer some protection.

- **Colon**: obesity and high alcohol intake (convincing); consumption of large amounts of red meat (particularly processed meat) modestly increases risk; attenuated by high fibre intake

- Calcium supplementation/milk consumption is moderately important in relation to protection against colon cancer

- Strong evidence for benefits of physical activity.
Digestive System - other conditions

• Gut flora changes with age (↓ bifidobacteria, increased diversity). **Prebiotics** may help reverse this but there are few studies in older people. [**Prebiotics**: calcium absorption, ? cancer protection and gut barrier function vs. infection]

• **Probiotics**, alone or in combination with **prebiotics**, show considerable promise as therapy for antibiotic-associated diarrhoea. *S. boulardii* may be able to counter *C. difficle* associated diarrhoea. More trials needed.

• High fibre intake protects against diverticular disease

• Fibre plus adequate fluid may protect against constipation. Also a role for **probiotics** and **some prebiotics** (intervention trials).
Nutritional issues and priorities
NDNS older people: % with a low status of selected nutrients

free living men
free living women
institutions men
institutions women

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# Vitamin C status, older people

<table>
<thead>
<tr>
<th></th>
<th>Plasma vitamin C (µmol/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free living, own teeth</td>
<td>49.1</td>
</tr>
<tr>
<td>Free living, without teeth</td>
<td>39.4</td>
</tr>
<tr>
<td>Residential care, own teeth</td>
<td>24.6</td>
</tr>
<tr>
<td>Residential care, without teeth</td>
<td>21.1 (median 11.4)</td>
</tr>
</tbody>
</table>

Steele et al, 1998  **Below 11 µmol/l - biochemical depletion**
# Prevalence (%) of low vitamin D status in the UK (<25nmol/L)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Males (%)</th>
<th>Females (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-6, 7-10</td>
<td>3, 4</td>
<td>2, 7</td>
</tr>
<tr>
<td>11-14, 15-18</td>
<td>11, 16</td>
<td>11, 10</td>
</tr>
<tr>
<td>19-24</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>25-49</td>
<td>16, 12</td>
<td>13, 15</td>
</tr>
<tr>
<td>50-64</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>65-74 (community)</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>75-84 (community)</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>85+ (community)</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>65-84 (institutions)</td>
<td>36</td>
<td>38</td>
</tr>
</tbody>
</table>

Source: NDNS series
Vitamin D status (25OHD), UK subjects aged 47y (n=7437) in 1958 birth cohort

<table>
<thead>
<tr>
<th></th>
<th>Winter/ Spring</th>
<th>Summer/ Autumn</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25nmol/L</td>
<td>15.5%</td>
<td>3.2%</td>
</tr>
<tr>
<td>&lt;40nmol/L</td>
<td>46.6%</td>
<td>15.4%</td>
</tr>
<tr>
<td>&lt;75nmol/L</td>
<td>87.1%</td>
<td>60.9%</td>
</tr>
</tbody>
</table>

Source: Hypponen & Power 2007
## Vitamin & mineral intakes: % below LRNI; SACN 2007

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>% British Females below LRNI</th>
<th>&lt; 4</th>
<th>4 - 6</th>
<th>7 - 10</th>
<th>11 - 14</th>
<th>15 - 18</th>
<th>19 - 34</th>
<th>35 - 64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riboflavin</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>22</td>
<td>21</td>
<td>12</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Vitamin B₆</td>
<td></td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Folate</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Vitamin A</td>
<td></td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>20</td>
<td>12</td>
<td>13</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td>16</td>
<td>4</td>
<td>3</td>
<td>44</td>
<td>48</td>
<td>40</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>24</td>
<td>19</td>
<td>7</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Magnesium</td>
<td></td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>51</td>
<td>53</td>
<td>21</td>
<td>9</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: National Diet and Nutrition Survey 2003
Malnutrition in older adults -1

• Despite rates of obesity, malnutrition is still surprisingly common

• Reduces immune response, impairs wound healing, reduces muscle strength, causes fatigue and depression

• Increased risk of hospital admission and increased length of stay in hospital

• Estimated that 10-40% of adults in UK hospitals and care homes are malnourished (based on BMI < 20) (NICE 2006)
Malnutrition in older adults -2

• Unintentional weight loss is common in elderly people

• The onset of malnutrition is usually slow, resulting from a period of weeks or months where dietary intake has not matched requirements.

• Importance of routine assessment on admission and weekly thereafter, using tools such as the MUST tool – can be used in absence of height and weight
  www.bapen.org.uk
Priorities for action: life-course approach

• Modify fatty acid profile - ↓ saturates, ↑unsaturated FA
  - especially LC n-3 PUFA, also ? MUFA

• More fruit & veg, wholegrain/ wholemeal foods

• Sodium: ↓ in context of reducing blood pressure (effects of excess alcohol and obesity important too)

• Increase physical activity

• Establish energy balance and reduce prevalence of overweight & obesity

• Prevent malnutrition and micronutrient insufficiency
  - vitamins D, C, B12, folate, riboflavin, iron, calcium (older people)
Conclusions

• Nutrition and lifestyle can have a profound impact on healthy life expectancy: start young!!

• A healthy diet & regular physical activity will aid recovery from illness and help protect against health problems, such as anaemia, diabetes, osteoporosis, heart disease, stroke, under- /overweight, constipation & other digestive disorders

• Important that older adults enjoy their food and maintain the desire to eat – the eating environment can make a real difference.

• With longevity increasing, health care costs will escalate out of control unless we work together to improve the quality of those extra years.
BNF resources to help get the key messages across

- Website information – includes top tips, chart and recipes
- Q/As for journalists are in pack
- Conference report and 10 key facts will follow
- Task Force report available at reduced rate today using special order form in your packs
# Live long and healthily

<table>
<thead>
<tr>
<th>Particular good for...</th>
<th>Important food component</th>
<th>Great food sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>The heart</td>
<td>Healthier fats – unsaturated fatty acids</td>
<td>Vegetable oils &amp; reduced fat spreads, nuts, seeds, avocados</td>
</tr>
<tr>
<td>The heart, brain &amp; joints</td>
<td>Long chain omega 3s</td>
<td>Oily fish</td>
</tr>
<tr>
<td>The gut &amp; heart</td>
<td>Insoluble fibre</td>
<td>Wholegrain foods, nuts, seeds, vegetables, skins of some fruits including tomatoes</td>
</tr>
<tr>
<td>The heart</td>
<td>Soluble fibre</td>
<td>Pulses, oats, rye, barley, some fruits &amp; vegetables, potatoes</td>
</tr>
<tr>
<td>Muscle, immune system</td>
<td>Protein</td>
<td>Lean meat, chicken, seafood, eggs, pulses, mycoprotein, soy products</td>
</tr>
</tbody>
</table>

| All body systems       | Antioxidants: Vitamin C, Beta-carotene, Vitamin E, Lycopene | Tomatoes, peppers, broccoli, cabbage, citrus fruits, melon, kiwi, Dark green, yellow & orange fruit & vegetables (carrot, pumpkin, spinach, melon), Plant oils, nuts, seeds, wheatgerm, Tomatoes, guava, apricots, watermelon, papaya, pink grapefruit, Kiwi fruit, grapes, spinach, kale, broccoli, red & orange peppers, Brazil nuts, bread, fish including shellfish, meat, eggs |
| Prostate               | Lutein/zeaxanthin | |
| Eye                    | Selenium | Leafy vegetables, fruits, beans, wholegrain products, liver, nuts, fortified breakfast cereals |

| The heart & brain      | Folate | Leafy vegetables, fruits, beans, wholegrain products, liver, nuts, fortified breakfast cereals |
| Bone & muscle          | Vitamin D | Oily fish, eggs, margarine & spreads, fortified breakfast cereals |
| The heart & brain      | Vitamin B12 | Fish, meat, poultry, eggs, milk & milk products, fortified breakfast cereals |
| Bone                   | Vitamin K* | Green leafy vegetables, liver, Brussels sprouts, broccoli, asparagus, some fruits (chubarb, kiwi) |
| Bones & heart          | Calcium | Low/reduced fat milk/dairy products, fortified soya products, bread, canned fish (with bones) |
| Heart                  | Potassium | Root vegetables, fruit, lentils, beans, fish, milk, yogurt, nuts |
| Blood                  | Iron | Liver, meat, beans, nuts, dried fruit, wholegrain foods, fortified breakfast cereals, dark green leafy vegetables |
| Blood, immune system   | Zinc | Meat, shellfish, milk/dairy foods bread, cereal products |
| The heart & brain      | Alcohol in moderation | Alcoholic drinks |
| Teeth                  | Fluoride | Drinking water, tea, fish |

*Vitamin K can decrease the effect of warfarin (seek advice from your GP if necessary).
For more information see:

- http://www.nutrition.org.uk/healthyageing
Immune System

- Impairments of the immune system occur with ageing – over-expression of inflammatory cytokines causes low level chronic inflammation with possible role in age-related conditions such as atherosclerosis.
- Long chain n-3 PUFA supplementation, antioxidants, weight loss and increased physical activity can reduce acute and probably chronic inflammation.
- Protein and energy deficient diets and micronutrient deficiencies (e.g. zinc, copper, iron, selenium, vitamins C, A, E, D, B6, B12) impair immune function & increase risk/severity of infections.
- No evidence to support routine use of micronutrient supplements.

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Endocrine System

- Hormonal regulation is central to many physiological processes (e.g. blood pressure, bone density)
- Weight reduction (by diet + physical activity) can help normalise adipokine production and have beneficial effect on blood hormone levels
- There is insufficient information about interactions between endocrine system, ageing and individual lifestyle factors
- Carbohydrate/fibre - nature and quality influence postprandial blood glucose level and fluctuations in circulating insulin
- Low GI diet and resistant starch: Impact on glycaemic and insulinaemic responses
- Fat quality – replacing saturates with MUFA can increase insulin sensitivity in those with total fat intake <37% energy (Vessby et al. 2001); Role of long chain n-3
- Dietary patterns rich in plant derived foods may have beneficial effect (but findings inconsistent)
- Specific plant compounds: phytoestrogens may aid menopausal symptoms but insufficient evidence of effect in diabetes, colon cancer, breast cancer (Cassidy et al. 2006)