Nutritional considerations for older adults – evidence-based clinical interventions

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Proportion of older adults increasing

UK population 65+

2010 10 million

2030 15.5 million

2050 19 million

IN 2050 1/3 OF OUR POPULATION WILL BE OVER 65
Talk overview

1) Impact of changing diet on overall health of older adults (fruit and vegetable intake; Mediterranean diet)

2) Conducting dietary intervention studies

3) Conducting dietary intervention studies in older people

4) Strategies for changing dietary behaviours amongst older adults
• As proportion of older people increases, so will incidence of chronic diseases and proportion of the population with disability

• Strategies that reduce age-related morbidity and reduce chronic disease prevalence are therefore important for healthy ageing

• **Good nutrition contributes to health of older people and their ability to recover from illness**

• May help **lessen the burden of health costs** by enabling older people to remain independent for as long as possible and improve QoL
Do nutritional requirements change in older age?
### Energy requirements

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male (Kcals/d)*</th>
<th>Female (Kcals/d)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-54</td>
<td>2580</td>
<td>2100</td>
</tr>
<tr>
<td>55-64</td>
<td>2580</td>
<td>2080</td>
</tr>
<tr>
<td>65-74</td>
<td>2340</td>
<td>1910</td>
</tr>
<tr>
<td>75+</td>
<td>2290</td>
<td>1840</td>
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*SACN, 2011. Dietary reference values for energy.*

Although this means eating less, requirements for protein, vitamins and minerals remain largely unchanged and can even be increased in some cases, therefore diet quality becomes increasingly important.
Recommendations to achieve a balanced diet

Eatwell plate, Department of Health
Current population dietary intakes

- **Fruit and vegetables:** 4.1 portions/day (19-64 years)
- **NSP (fibre):** 13.7-13.9g (19 years +)
- **Oily fish:** 54g/week (19-64 years)
- **NMES (sugar):** intakes exceeded requirements for all age groups
- **Vitamins:** from food were close to/above requirements
- **Total fat:** met requirements in all age/sex groups except for those over 65 years
- **Saturated fat:** exceeded requirements (19-64 years)
- **Minerals:** below requirements in some age groups (particularly 11-18 year olds)
Nutrient status of UK older people

- UK National Diet and Nutrition Survey > 65 years found deficiencies of virtually all nutrients increased in prevalence with *increasing age* and *fall in socioeconomic status*
- Intake of most nutrients were ~ 10% lower in those > 85 years compared with those 65-74 years
- FV consumption: 3/d (free living); 2.1/d (institution)
- Fibre intake: 12g/d (free living); 10g/d (institution)
- Nutrients of concern: protein, Ca, Fe, Na, vitamins B12, and D
Key nutrition messages for older adults

- Maintain a healthy body weight
- Eat a balanced diet
- Eat a variety of foods each day
- Ensure adequate fluid (8-10 cups) and fibre intake
- Reduce salt intake
- Ensure adequate intake of protein, Vit D, Ca, Fe, B12
- Evidence for specific supplements limited
Fruit and vegetable intake and disease risk
Fruit and vegetables

• Diets rich in fruit and vegetables are:
  – linked with reduced risk of chronic disease
  – recommended worldwide within dietary guidelines
  – majority (>60%; 82% in NI) do not meet 5-a-day recommendation
Number of deaths saved or delayed by meeting dietary recommendations in the UK

Over 15,000 of avoided deaths due to increased consumption of fruit and vegetables

Fruit and vegetable intake and chronic disease risk

From observational studies
Per portion increase in fruit and veg:
4% reduction in risk of CHD
Per portion increase in fruit and veg:
5% reduction in risk of stroke
Per portion increase in fruit and veg:
1-1.5% reduction in risk of cancer

Risk of CHD for 3-5 and >5 servings of FV/d compared with <3 servings

CHD rates for one portion/d increment
He et al., 2006; Dauchet et al., 2006; WCRF 2007; Boffetta et al., 2010
People who eat lots of fruit and vegetables tend to also have a better overall diet, exercise more, are less likely to smoke, and have higher socio-economic status.

Clustering of health behaviours

Fruit and vegetable intervention studies with clinically relevant endpoints a more robust study design
Effect of increased fruit and vegetable intake on heart health in patients with high blood pressure

Volunteers

- 1 portion daily
- 4 weeks
- 8 weeks
- 1 portion
- 3 portions
- 6 portions

Run-in
Randomisation
Intervention

- Heart function

• Weekly deliveries and contact with research team
• Compliance with intervention assessed at start and end
• Effect on forearm blood flow — linked with risk of heart disease

Heart function
Increasing intake of fruits and vegetables improves heart function in patients with high blood pressure.

McCall et al., 2009

An extra daily portion of fruit and vegetables increased forearm blood flow by 6.2%
Fruit and vegetable intake

**Effect of increased fruit and vegetable consumption on physical function and muscle strength in older adults**

Charlotte E. Neville · Ian S. Young · Sarah E. C. M. Gilchrist · Michelle C. McKinley · Andrew Gibson · J. David Edgar · Jayne V. Woodside

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Compliance confirmed by assessment of blood-based biomarkers

Neville et al., 2013
In a general linear model, portion predicted final grip strength, with initial grip strength included in the model (p=0.02)

Change in vitamin C positively associated with change in grip strength (r=0.24, p=0.04)
What is the Mediterranean diet?
The Mediterranean diet

Emphasizes a diet that is

- high in fruits, vegetables, bread, other forms of cereals, beans, nuts, and seeds
- includes olive oil as an important fat source and dairy products, fish, and poultry consumed in low to moderate amounts
- eggs consumed 2-4 times weekly, and little red meat
- wine is consumed in low to moderate amounts
- dietary pattern based on food patterns typical of many regions in Greece and southern Italy in the early 1960s

Kris-Etherton, Circulation 2001
Mediterranean diet and cardiovascular disease
Risk of mortality from or incidence of cardiovascular diseases associated with two point increase in adherence score for Mediterranean diet.

Sofi F et al. Public Health Nutr 2013
Primary endpoint: acute MI, stroke or death from cardiovascular causes

Med diet olive oil HR 0.70 (0.53-0.91); P=0.009

Med diet nuts HR 0.70 (0.53-0.94); P=0.02

Secondary endpoint: total mortality

Med diet olive oil HR 0.81 (0.63-1.05); P=0.11

Med diet nuts HR 0.95 (0.73-1.23); P=0.68

**Figure 1. Kaplan–Meier Estimates of the Incidence of Outcome Events in the Total Study Population.**

Panel A shows the incidence of the primary end point (a composite of acute myocardial infarction, stroke, and death from cardiovascular causes), and Panel B shows total mortality. Hazard ratios were stratified according to center (Cox model with robust variance estimators). CI denotes confidence interval, EVOO extra-virgin olive oil, and Med Mediterranean.

Estruch et al., NEJM, 2013
Mediterranean diet and cognitive function
Association between a 2-point increase of adherence score to the Mediterranean diet and the risk of incidence of neurodegenerative diseases

<table>
<thead>
<tr>
<th>Study</th>
<th>Relative risk (95% CI)</th>
<th>Weight (%)</th>
<th>Relative risk (95% CI)</th>
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<tbody>
<tr>
<td>Scarmeas (2006) (24)</td>
<td>0.83 (0.70, 0.98)</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>Gao (2007) (M) (25)</td>
<td>0.93 (0.80, 1.08)</td>
<td>26.9</td>
<td></td>
</tr>
<tr>
<td>Gao (2007) (F) (25)</td>
<td>0.85 (0.72, 1.00)</td>
<td>20.8</td>
<td></td>
</tr>
<tr>
<td>Feart (2009) (11)</td>
<td>1.00 (0.71, 1.40)</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Scarmeas (2009) (12)</td>
<td>0.85 (0.73, 0.99)</td>
<td>25.5</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>0.87 (0.81, 0.94)</strong></td>
<td><strong>100</strong></td>
<td><strong>0.87 (0.81, 0.94)</strong></td>
</tr>
</tbody>
</table>
Changes in cognitive function by Mediterranean Diet intervention group

Valls-Pedret et al., 2015
Mediterranean diet and frailty
Components of the Mediterranean diet?

Fig. 1. Potential nutritional interventions in relation to putative physiological aetiological factors influencing sarcopenia (modified from\(^8\)). COPD, chronic obstructive pulmonary disease.
Conducting dietary intervention studies

*Single nutrient* supplements which can be placebo-controlled are relatively straightforward
Guidelines for the Design, Conduct and Reporting of Human Intervention Studies to Evaluate the Health Benefits of Foods

Robert W. Welch¹, Jean-Michel Antoine², Jean-Louis Berta³, Achim Bub⁴, Jan de Vries⁵, Francisco Guarnier⁶, Oliver Hasselwander⁷, Henk Hendriks⁸, Martin Jäkel⁹, Berthold V. Kolitzko¹⁰, Chris C. Patterson¹¹, Myriam Richelle¹², Maria Skarp¹³, Stephan Theis¹⁴, Stéphane Vidy¹⁵ and Jayne V. Woodside¹¹

Welch et al., 2011; Woodside et al., 2013; Woodside et al., 2015

Particular design issues with food- or whole diet-based intervention studies

Intervention: selection of control
Blinding
Compliance
# Design of clinical trials/efficacy studies to test effect of dietary change on ageing outcomes

<table>
<thead>
<tr>
<th>Think…</th>
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</table>
| **Participants** | Baseline level of outcome measure  
Baseline dietary intake |
| **Design issues** | Duration of intervention  
Outcomes measured (consider likely mechanisms)  
Control group  
Blinding  
Increase in adherence to be achieved  
How to encourage, monitor and measure compliance  
Monitor other lifestyle behaviours  
Effect of genetic background? |
Conducting intervention studies in older people

Studies to encourage behaviour change
Nutrition, ageing and disease

Genes

Environment (including social)

Nutrition

Change in physiological function

Disease

Ageing

Longevity

Treatment Medication
One example...change in eyesight

- Deteriorating eyesight can affect:
  - Buying food
  - Getting to supermarket (inability to drive)
  - Reading food labels
  - Counting money
  - Preparing food
Dental considerations

AIM – to develop and test a dietary intervention to accompany shortened dental arch intervention

Conclusion

Tooth replacement using conventional and functionally orientated treatment for partially dentate elderly showed significant improvements in MNA score 12 months after intervention.

Given positive effects of shortened dental arch on QoL and proven cost-effectiveness...
Ageing-related social and emotional considerations

- Whether or not a person lives alone
- How many daily meals are eaten
- Who does shopping and cooking
- Adequate income to purchase appropriate foods
- Alcohol and medication use

ALL of these factors may interfere with appetite or affect ability to purchase, prepare or consume an adequate diet

Need to consider when designing interventions to encourage behaviour change
How to encourage adoption of a Mediterranean diet
Peer support to encourage adoption of the Mediterranean diet

- Explore feasibility of peer support as a strategy to encourage adoption of the MD in those at high risk of CVD
- Peer support intervention has developed through direct interaction with the intended target group

Primary endpoint: change in MD score

National Prevention Research Initiative; MRC
Initial work examining attitudes to dietary change in MCI patients
Encouraging behaviour change in mild cognitive impairment patients: development of educational material

Objectives

• To explore attitudes of mild cognitive impairment (MCI) patients and health professionals regarding diet and lifestyle and its relationship with cognitive health

• To design, develop and pilot test educational material (EM) to help encourage lifestyle behaviour change in these patients

Methods

• Healthcare professionals (n=10), MCI patients and their caregivers (n=36) were recruited from Belfast and Dublin

• Focus groups and structured interviews conducted
Structured interviews
healthcare professionals (n=10)

Focus groups
MCI patients and caregivers (n=36)

Telephone interview
same MCI patients and caregivers (n=36)

Telephone interview
new MCI patients and caregivers (n=27)

Collection of baseline information

Drafting of EM

Refinement of EM

Feedback on EM

Study design

Data gathering phase

Pilot testing phase
Draft educational material developed
Results

“Leaflet, you have more time to study it, I think so.”
“Wall charts, that you could place things on that you could say you’ve done it, step-by-step process.”

“Leaflet, you have more time to study it, I think so.”
“I put things in (the oven) and forget about them, I’ll maybe remember the next morning.”

“I knew it was good for you but I didn’t connect it to memory.”

“I would take supplements...more so for joints and things.”

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Neville et al., Aging & Mental Health, 2013
Conclusions – behaviour change and MCI

- HPs alluded to the lack of clinical trial evidence for the link between lifestyle and MCI risk
- Lifestyle-related discussions tended to be patient-driven
- MCI patients lacked awareness of the lifestyle-cognition link

- MCI patients preferred EM - concise, eye-catching and in written format, with personal delivery of information
- Staged or gradual approach to delivery of information needed - maintain patient motivation and help with information retention
- MCI patients approved of the EM - were heterogeneous in terms of lifestyle, willingness to change and support needed to change
- Tailored EM are potentially useful tool for use in interventions but will require further refinement and formal evaluation – PhD studentship/CARDI Fellowship commencing October 2015

Neville et al., Aging & Mental Health, 2013
Summary

- Strategies to encourage healthy ageing are increasingly important to global public health
- Diet may be important to reduce chronic disease risk and maintain health
- Reasonable observational evidence base for benefits of dietary factors, including FV intake and Mediterranean Diet
- Randomised trial data more sparse but accumulating
- Careful consideration given to study design when planning future efficacy studies and interventions to promote behaviour change
Nutrition and Metabolism Group, Centre for Public Health, QUB

Thank-you