Cardiovascular health benefits of vegetables and their components

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Cardiovascular disease
Number 1 cause of death
Kills 1 person every 12 minutes

Tobacco use
Harmful use of alcohol
Physical inactivity
Obesity
Unhealthy diet

Diets low in vegetables - 1.8 million deaths globally

>90% do not achieve vegetable recommendations
Keep emphasising the importance of increasing vegetables?

Streamline recommendations - focus on vegetables that are more beneficial?
Dietary nitrate

\[ \downarrow \]

Blood pressure
~80% nitrate intake comes from vegetables

Vegetable types
- Cruciferous
- Allium
- Leafy green
- Yellow/orange/red
- Legumes

Development of a nitrate database

Nitrate intake

Cardiovascular disease mortality
Subclinical atherosclerosis
Records identified through database searching (n=12,275)
- Cab abstracts (n=5,575)
- Medline (n=4,036)
- Agricola (n=2,664)

Records after duplicates removed (n=9,932)

Records excluded (n=9,235)

Full-text articles assessed for eligibility (n=697)

Studies included in database (n=255)

Full-text articles excluded (n=442)

Additional records identified through other sources (n=66)
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Identification

Screening
Records identified through database searching (n=12,275)
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Nitrate content ≥ 2000 mg/kg fresh weight

- Chinese flat cabbage
- Arugula
- False pak-choi
- Corn salad
- Mustard greens
- Potherb mustard
- Pak choi
- Swiss chard
- Chinese broccoli
- Sea beet
- Garden cress
- Chinese amaranth

![Diagram showing nitrate content of various vegetables, with Chinese flat cabbage listed at the top, indicating the highest nitrate content.]
Nitrate content 1000 to < 2000 mg/kg fresh weight

- Spinach
- Watercress
- Kale
- Lettuce
- Radish
- Rutabago
- Beet
- New Zealand Spinach
- Celery
- Water spinach
- Kohlrabi
- Malabar spinach
- Chinese cabbage
- Fennel
Nitrate content 500 to < 1000 mg/kg fresh weight

- Chinese flat cabbage
- Arugula
- False pak-choi
- Corn salad
- Mustard greens
- Potherb mustard
- Pak choi
- Swiss chard
- Chinese broccoli
- Sea beet
- Garden cress
- Chinese amaranth
- Spinach
- Watercress
- Kale
- Lettuce
- Radish
- Beet
- New Zealand Spinach
- Celery
- Water spinach
- Kohlrabi
- Malabar spinach
- Chinese cabbage
- Fennel
- Endive
- Fenugreek
- Turnip
- Chicory leaves
Nitrate content $\leq$ 500 mg/kg fresh weight

- **Nitrate content ≥ 2000 mg/kg FW**
- **Nitrate content 1000 to < 2000 mg/kg FW**
- **Nitrate content 500 to < 1000 mg/kg FW**
- **Nitrate content ≤ 500 mg/kg FW**
Longitudinal study of ageing women

15 year follow-up study (1998-2013)
n=1500
70-85 years
<table>
<thead>
<tr>
<th>VEGETABLES (INCLUDING FRESH, FROZEN AND TINNED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes, roasted or fried (include hot chips)</td>
</tr>
<tr>
<td>Potatoes cooked without fat</td>
</tr>
<tr>
<td>Tomato sauce, tomato paste or dried tomatoes</td>
</tr>
<tr>
<td>Fresh or tinned tomatoes</td>
</tr>
<tr>
<td>Peppers (capsicum)</td>
</tr>
<tr>
<td>Lettuce, endive, or other salad greens</td>
</tr>
<tr>
<td>Cucumber</td>
</tr>
<tr>
<td>Celery</td>
</tr>
<tr>
<td>Beetroot</td>
</tr>
<tr>
<td>Carrots</td>
</tr>
<tr>
<td>Cabbage or Brussels sprouts</td>
</tr>
<tr>
<td>Cauliflower</td>
</tr>
<tr>
<td>Broccoli</td>
</tr>
<tr>
<td>Silverbeet or spinach</td>
</tr>
<tr>
<td>Peas</td>
</tr>
<tr>
<td>Green beans</td>
</tr>
<tr>
<td>Bean sprouts or alfalfa sprouts</td>
</tr>
<tr>
<td>Baked beans</td>
</tr>
<tr>
<td>Soy beans, soy bean curd or tofu</td>
</tr>
<tr>
<td>Other beans (include chick peas, lentils, etc.)</td>
</tr>
<tr>
<td>Pumpkin</td>
</tr>
<tr>
<td>Onion or leeks</td>
</tr>
<tr>
<td>Garlic (not garlic tablets)</td>
</tr>
<tr>
<td>Mushrooms</td>
</tr>
<tr>
<td>Zucchini</td>
</tr>
</tbody>
</table>

25 vegetable items
Nitrate intake by food group

- Vegetables: 84.4%
- Grain: 2.7%
- Other: 3.0%
- Meat: 3.3%
- Fruit: 6.4%
- Dairy: 0.2%
Nitrate intake by vegetable

- Lettuce and other salad greens: 23%
- Spinach: 12%
- Celery: 10%
- Beetroot: 9%
- Potatoes: 8%
- Cabbage: 6%
- Pumpkin: 5%
- Broccoli: 5%
- Other: 22%
- Fruit: 6.4%
- Meat: 3.3%
- Other: 3.2%
- Cheese: 2.7%
- Dairy: 0.2%

Vegetables: 54.4%
Cardiovascular disease survival rate

- T1 (<52.7 mg/d): Referent
- T2 (52.7-76.4 mg/d): HR 0.58 (95% CI 0.42, 0.82), P = 0.002
- T3 (>76.4 mg/d): HR 0.65 (95% CI 0.47, 0.92), P = 0.013
  - P for trend = 0.016
Common carotid artery intima media thickness
Common carotid artery intima-media thickness (CCA-IMT)

Mean CCA-IMT (mm)

- <53 mg/d
- ≥53 mg/d

Maximum CCA-IMT (mm)

- <53 mg/d
- ≥53 mg/d

P = 0.036
P = 0.018
Summary

↓ risk of cardiovascular disease mortality

↓ carotid artery intima-media thickness
Cardiovascular disease mortality

-ベジタリアン・プロテイン（葉物）で13%↓
-サイレント・スニッカーフード（野菜）で18%↓
-クルクマ・クッキング（野菜）で11%↓

-ジンジャ・アーユルヴェダ（野菜）で×
-ピーナッツ・アイシング（豆）で×
Common carotid artery intima-media thickness

- 0.8%
Cruciferous, allium and nitrate-rich vegetables reduce risk of cardiovascular disease mortality and subclinical atherosclerosis.
Questions?

- Reduced CVD death and atherosclerosis
- Reduced CVD death
- Reduced CVD death
- Reduced CVD death and atherosclerosis