Mediterranean diet and health

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Outline of talk

- What IS a Mediterranean diet?
- Why is it so good?
- What does it protect against?
- What is new?
- Can we make it any better?
- New technologies for studying it.
The Mediterranean diet is based on the traditional eating habits of the people bordering the Mediterranean Sea.
The diet

- Abundant and variable plant foods
- High consumption of whole grain cereals
- Olive oil as the main added fat
- Low intake of red meat
- High intake of oily fish
- Moderate consumption of wine
Abundant and variable plant foods

5+a DAY

Red Yellow/Orange Brown/White Green Blue/Purple

THE COLOUR WAY
Polyphenols

Blue/Purple
Major pathways activated by polyphenols

- PI3K
- Akt/mTOR
- Erk/Jnk
- ROS
- Proteasome
- Sirt1
- FOXOs
- AMPK
- Nrf2
- NFκB

Polyphenols
We are not alone.....

Gut microbiota

Polyphenols

Microbial proportion
Changes in adhesion/colonization

Production of active metabolites
Changes in bioavailability
High consumption of whole grain cereals
Dietary fibre benefits

Direct:
- ↓ gut transit time
- ↑ stool bulking
- ↓ diarrhoea (Soluble)
- ↓ constipation (Insoluble)

Effects on the gut microbiota:
- SCFA production
- Regulation of gut motility
- Maintains functional immune homeostasis
- ↓ Inflammation
- ↓ Permeability
- ↑ Tissue healing
Olive oil as the main added fat

Mediterranean diet: The secret to a long life... drink a shot of olive oil every day
But don't try and scrimp on the cheap stuff

Tim Spector
Sunday 11 October 2015 12:33 BST
Low intake of red meat

- Heterocyclic amines are generated during the cooking of proteinaceous materials, including meat.
- The amount is dependent upon time and temperature.
- Their formation depends upon direct heat — that is, they are commonly formed during barbecuing, grilling and frying.
- Well done red meat and chicken have high amounts of these compounds.
High intake of oily fish

Docosahexaenoic acid (DHA)

Eicosapentaenoic acid (EPA)
Moderate consumption of wine

‘Alcohol drinking is one of the most important known causes of human cancer. With the exception of aflatoxin, for no single dietary factor is there such a strong and consistent evidence of carcinogenicity.’


Fonte: Cancer Report 2008 IARC
Effects of Initiating Moderate Alcohol Intake on Cardiometabolic Risk in Adults With Type 2 Diabetes: A 2-Year Randomized, Controlled Trial ONLINE FIRST

Yftach Gepner, MPH*; et al.

Ann Intern Med. Published online 13 October 2015 doi:10.7326/M14-1650
What is new – and can we make it better?

- Can we reduce inflammation?
- Do some of the new technologies help to show a beneficial effect at an early stage of the process?
- Could this/should this be applied to specific groups at high disease risks?
Nutrigenomics:
The study of how foods affect the expression of our genes
"I'm going to order a broiled skinless chicken breast, but I want you to bring me lasagna and garlic bread by mistake."
"We are what we eat and have eaten"
Received, Recorded, Remembered & Revealed
Proof of principle using Inflammatory bowel disease (IBD)

**Ulcerative colitis (UC)**
- Limited to the colon

**Crohn’s disease (CD)**
- Affects any part of the GI tract
Improving the Health Benefits of a New Zealand Diet

Plant & Food Research

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
C-Reactive Protein Levels

CRP Levels

Pre-intervention: 4.75
Post-intervention: 3.81
Will Nutrigenomics provide answers?

You need to ask the right Questions

Complex Nutrition + Complex Genotypes + Complex lifestyles + Omics technologies
Differential Expression of top 150 Genes in high Intervention Diet ($p < 10^{-8}$)

Week 1  Week 6
Non-hypothesis based study endpoint

• Focus on those genes.
• Search published literature, to learn about what they do in cells.
• Put together a story that explains why they might be relevant to the change in diet.
Pathways affected by dietary intervention

- protein kinase cascade
- primary metabolism
- G-protein coupled receptor protein signaling pathway
- phosphorylation
- dephosphorylation
- I-kappaB kinase/NF-kappaB cascade
- immune response

-log_{10} (p-value)
Adding in metabolomics

- To test for compliance
- To discover biomarkers
  - Effects of foods on metabolism
  - Metabolite markers showing effects of foods on health
Intestinal Microbiome

- Interplay between diet, genetics, intestinal microbiome and health is complex
- Plastic entity, able to adapt to changes due to external influences
- Different diseases have a set deviation from ‘normal’ ratio of bacterial phyla
- Analysis of microbiota is a potential localised, specific measure of diet compliance