Mediterranean Diet and Health
Jaime Rozowski, Ph.D.
Characteristic eating pattern of the Mediterranean Diet

- Olive oil as the main fat
- Abundance of vegetable foods
  - Fresh fruits and vegetables
  - Cereals and legumes
  - Nuts
- Frequent consumption of fish
- Wine
- Low consumption of red meats, dairy products and simple sugars
- Frequent use of spices (lemon, garlic, herbs)
Proximal composition of the MD

- **Proteins**: 18% of total calories (TC)
- **Carbohydrates**: 55% TC
- **Total fat**: 27% (25 a 40%)TC
  - **Polyunsaturated**: 7% of fat calories
  - **Monounsaturated**: 13% of fat calories
  - **Saturated**: 7% of fat calories
- **Cholesterol**: 270 mg/day
- **Fiber**: 40 - 50 g/day
Mediterranean Diet in Chile
Chile is a Mediterranean country

Why?
Chile is a Mediterranean country

1. Climate
2. Agriculture
3. Health
4. Diet
CLIMATE
1. Climate

- Dry summer and relatively humid winter

- 30° - 45° latitud

- Chile is one of the 5 regions in the world that have a mediterranean climate:
  - Mediterranean area in Europe and Africa
  - Central California in USA
  - Central Chile in South America
  - Area of Cape Town in South Africa
  - Southwest Australia
1. Mediterranean Climate

Fuente: Presentación Inaugural Seminario “Chile Potencia Agroalimentaria”, Alberto Montanari, Octubre 2004
2. MEDITERRANEAN AGRICULTURE
2. MEDITERRANEAN AGRICULTURE

• It is not specific of countries around the Mediterranean Sea

• It is the result of geographic, climatic, demographic and cultural conditions
2. MEDITERRANEAN AGRICULTURE

Fruits and vegetables
Cereals
Legumes and nuts
Wine
Olive oil
2. Mediterranean Agriculture

Countries where olives are grown
3. MEDITERRANEAN HEALTH
3. Mediterranean Health

Adjusted Mortality Rate Due to Coronary Heart Disease (deaths/100.000)
4. DIET
Food Contributions to Caloric Intake

España 1993-1995

Chile 1993-1995

Source: FAO Balance Sheets
Foods Contributions to Caloric Intake

España 1961

Chile 1993-1995

Source: FAO Balance Sheets
Intervention Studies using Mediterranean diet and Wine

-1998 Western Diet, Mediterranean diet in young students

-1999 Western MUFA or PUFA in young students

-2000 Mediterranean diet, 51-70 years old

-2008 Mediterranean diet by cafeteria modification
STUDY DESIGN

MEDITERRANEAN
n=21

HIGH FAT
n=21

TIME (DAYS)
Componentes de la Dieta Experimental

- aceite (32 ml oliva/32 ml maravilla)
- fibra (44/12)
- frutas y verduras (675/246)
- carnes rojas (72/209)
- carnes blancas (157/74)
- papas (117/230)
- pan, cereales y legumbres (311/261)
PLASMATIC POLYPHENOLS

- High fat diet
- Mediterranean diet

µM Rutin equivalent

Time (days)
DISEÑO DEL ESTUDIO

MUFA n = 22

PUFA n = 20

TIEMPO (semanas)
CALORIC DISTRIBUTION

MUFA DIET

PUFA
MUFA
SFA
PROT
CHO

42.1
22.2
13.2
18.4

MUFA DIET

PUFA
MUFA
SFA
PROT
CHO

42.0
14.5
12.6
12.6
18.4
OBJETIVOS
Programa de Alimentación Laboral

Disminuir la incidencia de Síndrome Metabólico

Una familia, 1989
Fernando Botero
2. SÍNDROME METABÓLICO

ENCUESTA NACIONAL DE SALUD (ENS 2003)

(Directora, Dra. Catterina Ferreccio, DSP, FM, UC)
PAL (Food at Work Program)

Canteen intervention strategy:

- Workers

- Mediterranean Diet
  (on a freedom to choose basis)

- Metabolic Syndrome
DESIGN OF THE INTERVENTION:

- **All workers** that use the industry canteen (lunch) are *invited* to participate.
- The *physical-architecture distribution* of food stands at the canteen is modified. Also the food offer is modified.
- **Educational talks** (4 per year) plus printed material and a *book specifically designed* for the workers.
- Supported by a multidisciplinary team.
**Dietary Intervention:**

Food Mediterranization in MD canteen (free choice)

**Measurements in Volunteers:** Clinical and nutritional interview, blood samples

- Abdominal Obesity
- HDL-Cholesterol
- Blood Pressure
- Triglycerides
- Fasting Glucose

**Metabolic Syndrome Risk Factors:**

**Other Measurements:**

- Nutrients in blood
- Oxidation parameters
- Inflammation, hemostasis, and others
VEGETABLES, excluding potatoes
(grams daily, per person, weekly averages, consumption at the industry canteen)

71% increase
BREAD

(grams daily, per person, weekly averages, consumption at the industry canteen)
Evolution of food composition at lunch time, average daily consumption per person at the cafeteria, along the twelve months diet mediterranization intervention period.

<table>
<thead>
<tr>
<th>Food item at lunch (grams/person)</th>
<th>Basal</th>
<th>Month 4</th>
<th>Month 8</th>
<th>Month 12</th>
<th>p value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables (without potatoes)</td>
<td>175 ± 27</td>
<td>280 ± 19</td>
<td>330 ± 63</td>
<td>264 ± 19</td>
<td>0.001</td>
</tr>
<tr>
<td>Potatoes</td>
<td>87 ± 36</td>
<td>83 ± 50</td>
<td>56 ± 32</td>
<td>83 ± 26</td>
<td>0.623</td>
</tr>
<tr>
<td>Fruits</td>
<td>47 ± 21</td>
<td>93 ± 30</td>
<td>149 ± 5</td>
<td>106 ± 13</td>
<td>0.000</td>
</tr>
<tr>
<td>White meat</td>
<td>53 ± 27</td>
<td>43 ± 28</td>
<td>56 ± 25</td>
<td>69 ± 16</td>
<td>0.535</td>
</tr>
<tr>
<td>Red meat</td>
<td>104 ± 19</td>
<td>38 ± 13</td>
<td>32 ± 4</td>
<td>38 ± 13</td>
<td>0.000</td>
</tr>
<tr>
<td>Fish and shellfish</td>
<td>3 ± 1</td>
<td>26 ± 9</td>
<td>17 ± 8</td>
<td>21 ± 2</td>
<td>0.001</td>
</tr>
<tr>
<td>Legumes</td>
<td>13 ± 4</td>
<td>16 ± 6</td>
<td>16 ± 2</td>
<td>14 ± 4</td>
<td>0.622</td>
</tr>
<tr>
<td>Dairy products</td>
<td>20 ± 8</td>
<td>7 ± 7</td>
<td>9 ± 6</td>
<td>11 ± 5</td>
<td>0.075</td>
</tr>
<tr>
<td>White bread</td>
<td>80 ± 9</td>
<td>31 ± 12</td>
<td>34 ± 5</td>
<td>34 ± 3</td>
<td>0.000</td>
</tr>
<tr>
<td>Whole grain bread</td>
<td>0</td>
<td>31 ± 6</td>
<td>24 ± 5</td>
<td>33 ± 2</td>
<td>0.000</td>
</tr>
<tr>
<td>Cereals</td>
<td>45 ± 8</td>
<td>57 ± 11</td>
<td>49 ± 3</td>
<td>62 ± 15</td>
<td>0.154</td>
</tr>
<tr>
<td>Vegetable fat</td>
<td>15 ± 9</td>
<td>0</td>
<td>13 ± 10</td>
<td>0 ± 1</td>
<td>0.011</td>
</tr>
<tr>
<td>Olive oil</td>
<td>0</td>
<td>7 ± 0</td>
<td>7 ± 1</td>
<td>6 ± 0</td>
<td>0.000</td>
</tr>
<tr>
<td>Canola oil</td>
<td>0</td>
<td>21 ± 0</td>
<td>9 ± 11</td>
<td>21 ± 3</td>
<td>0.000</td>
</tr>
<tr>
<td>Eggs</td>
<td>12 ± 6</td>
<td>6 ± 4</td>
<td>6 ± 2</td>
<td>4 ± 3</td>
<td>0.058</td>
</tr>
<tr>
<td>Sugar</td>
<td>16 ± 4</td>
<td>8 ± 4</td>
<td>14 ± 1</td>
<td>18 ± 3</td>
<td>0.005</td>
</tr>
<tr>
<td>MUFA/SFA</td>
<td>1.1 ± 0.0</td>
<td>3.7 ± 0.1</td>
<td>3.1 ± 1.1</td>
<td>3.2 ± 0.4</td>
<td>0.000</td>
</tr>
<tr>
<td>Omega-6/omega-3</td>
<td>39.3 ± 6.3</td>
<td>2.6 ± 0.2</td>
<td>15.4 ± 11.9</td>
<td>2.7 ± 0.1</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Data include all the workers that had lunch at the canteen, an average of 140, 145, 132, 155 workers per day at the basal month characterization period and at months 4, 8 and 12, respectively. * One way ANOVA of daily consumption values for each food item.
MEDITERRANEAN DIET SCORE, in elaboration (PAM-Chile)

- Vegetables (without potatoes)
- Leguminous (plus nuts and dried fruits)
- Fruits (raw or cooked)
- Whole cereales (in pasta, rice, bread, others)
- Lean red meat - (beef, chicken, pork, 7 - 8% fat)
- Fish and seafood
- Red meat (all fat-rich meats plus ham, viscera, sausages, from pork, bovine, and ovine sources)
- Alcohol (moderate and regular, versus abstinence, excess, or binge)
- Dairy products, low-fat, fermented
- Dairy high fat non-fermented (cream, whole milk, butter)
- Vegetable oil (sunflower, soy, canola, vegetable margarines)
- Olive oil
- Avocado
- Sugar and sugar in food
MEDITERRANEAN DIET SCORE, in elaboration (PAM-Chile)
WHAT HAPPENED WITH THE PREVALENCE OF METABOLIC SYNDROME?
ESTADO DE LA SALUD
Síndrome Metabólico

Distribución en Nº de factores de riesgo SM alterados
ESTADO DE LA SALUD
Síndrome Metabólico

Factores de Riesgo de SM alterados

Junio 2006 1,68  Octubre 2006 1,35
20% de disminución

p < 0,000
Average number of Metabolic Syndrome Risk Factors per person

(n = 90, a cohort of men that completed all controls, without medical treatment for these factors)

June 2006: 1.61
July 2007: 1.09

32% decrease

p < 0.000
Metabolic Syndrome and Mediterranean Diet (n = 90)
Metabolic Syndrome and Mediterranean Diet (n = 90)

N° of volunteers

Basal 4 months 8 months 12 months

15 13 10 8

48% decrease

3 FR 4 FR 5 FR
CONCLUSIONS

1- Diet Mediterranization in adults is feasible. Nutrition and Gastronomy must act synergistically to promote the diet.

2- Clinical, Nutritional and Biochemical parameters allow monitoring the effect of this Functional Food Diet.

3- Metabolic Syndrome is effectively controlled with Mediterranean Diet. A suitable Score has been developed.

4- Further efforts should center on functional foods, rich and enriched in:
   - polyphenol antioxidants (gut & systemic)
   - sirtuin agonists
   - w3, w9 fatty acids
   - dietary fiber
PARTICIPANTS

PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE

Faculty of Biological Sciences
Faculty of Medicine
Faculty of Engineering
THANK YOU