IDEAS QUE MUEVEN ANDALUCÍA

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Nutrición y Genómica

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Interprofesional del aceite de Oliva español

Las nuevas tecnologías “ómicas” claves en la personalización de la prevención y tratamiento de la enfermedad

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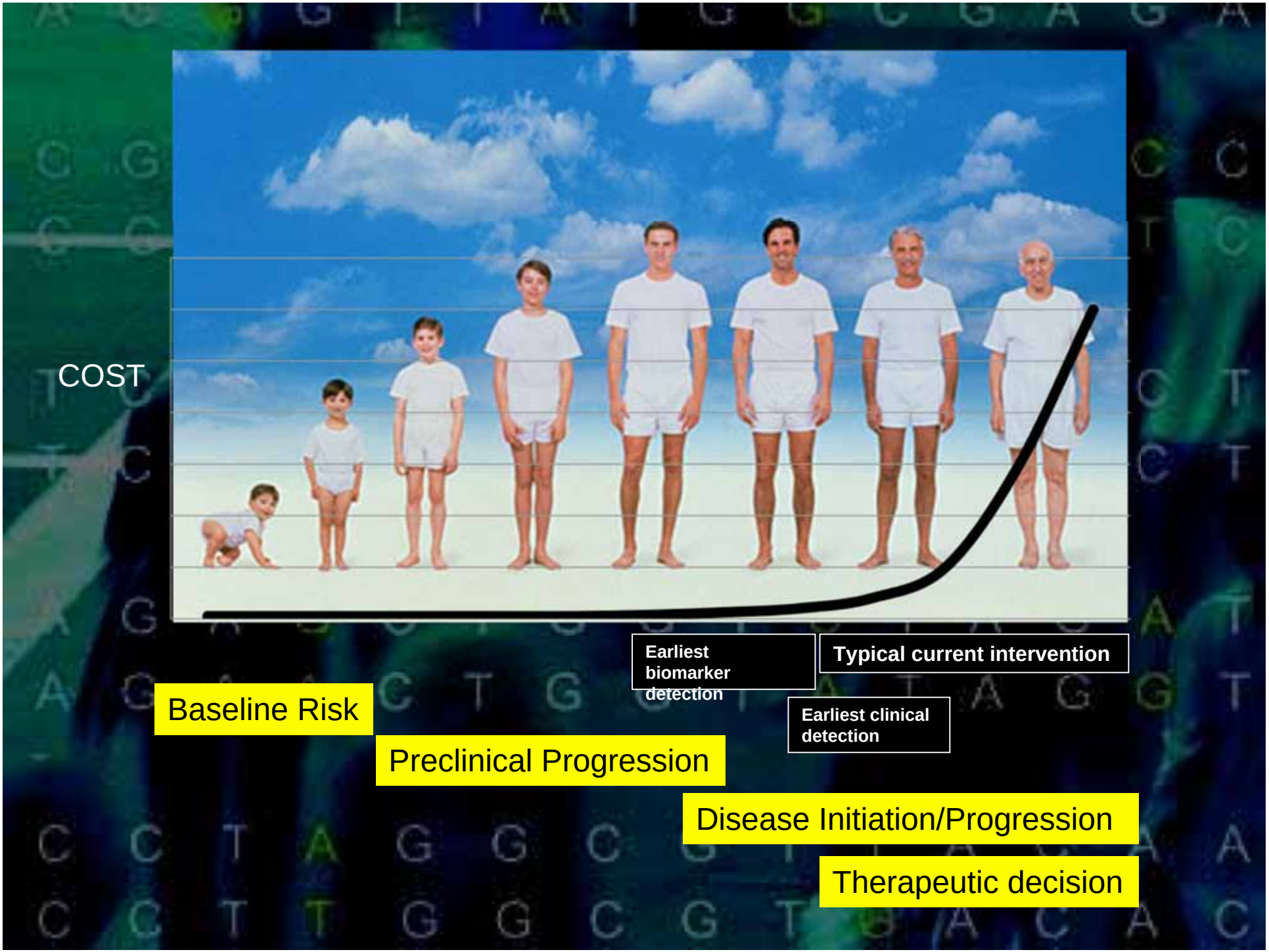
Today's

Reactive

Medicine


COST
Earliest biomarker detection
Typical current intervention
Earliest clinical detection
Baseline Risk
Preclinical Progression
Disease Initiation/Progression
Therapeutic decision

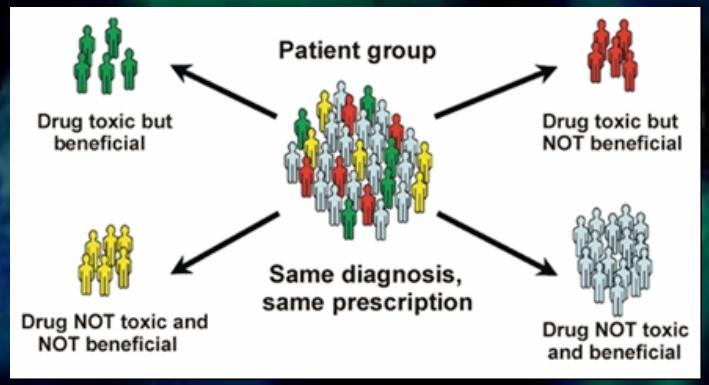
Today's
Reactive
Medicine

Tomorrow's
Proactive
Medicine

Tomorrow's Medicine

Predictive

Personalized



Preventive

Participatory

Prevention and Therapy are Personal (Personalized Medicine)

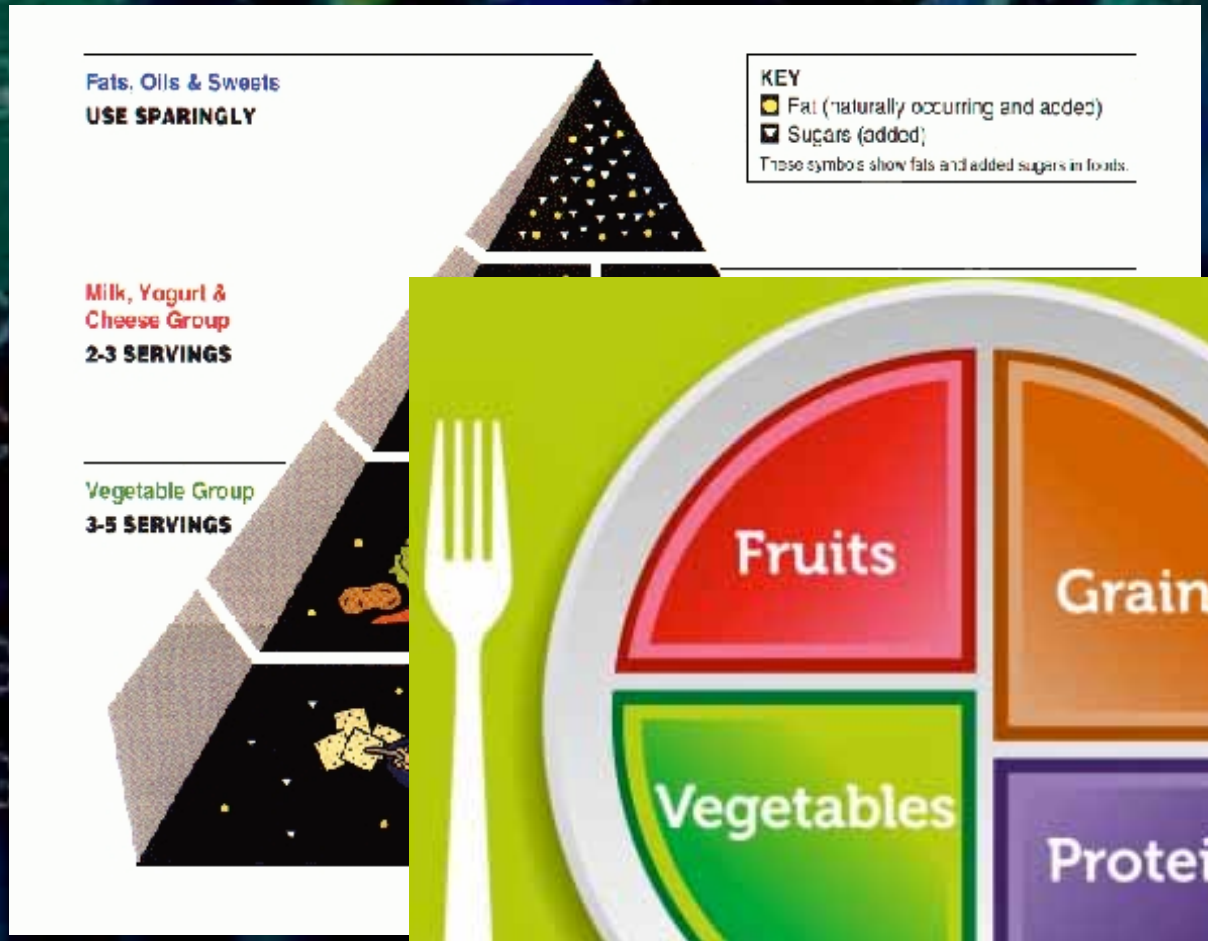
- We are all different.
- Some of our differences translate to how we react to foods and drugs –as individuals.
  - Some people need twice the standard dose to be effective
  - Some drugs work for one person but not for another
  - Some people have side effects, other don't
  - Some people get cardiovascular disease (cancer, obesity, diabetes ….) and others don't
- This is why individualized, or personalized medicine is important for each one of us.

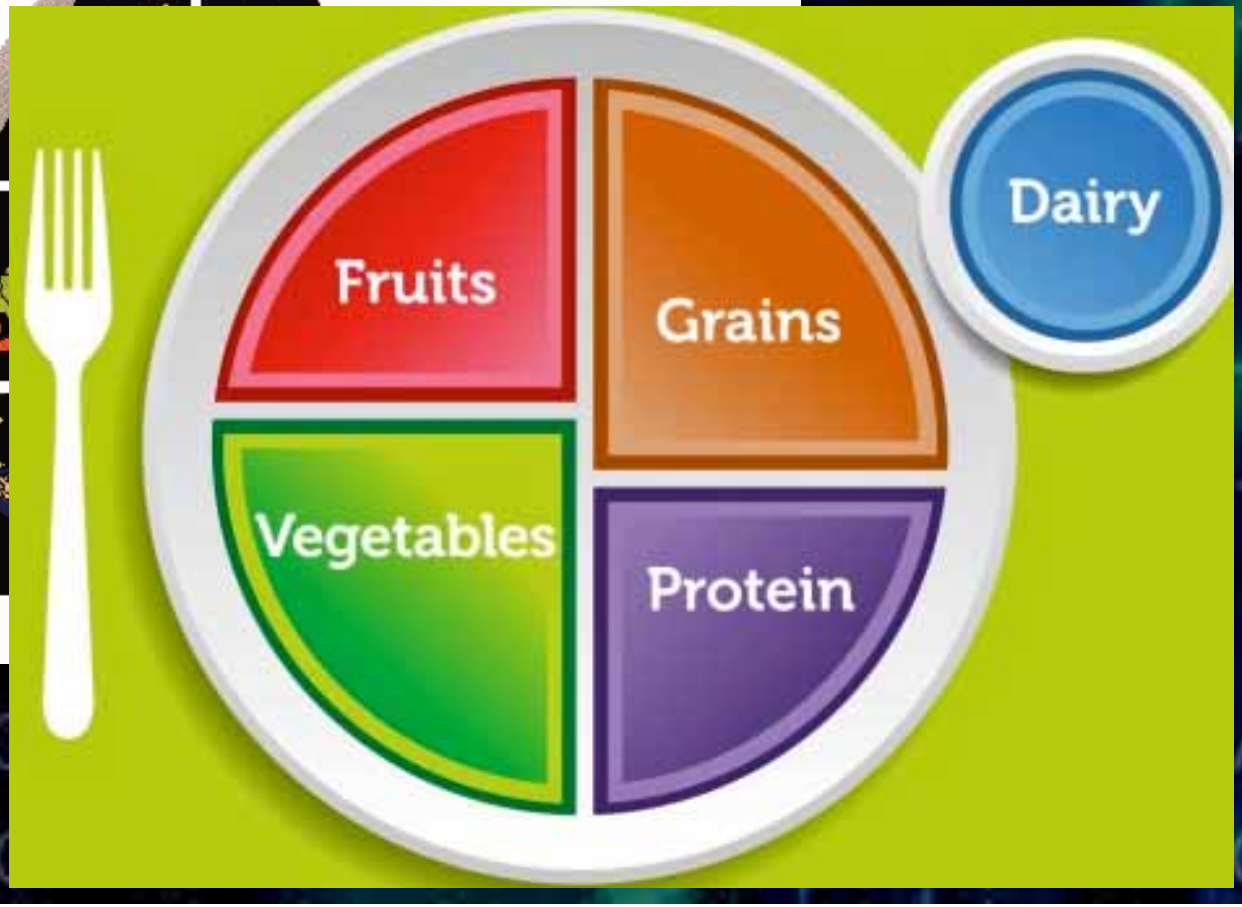
One Size (Dose) Fits All
(Current Medicine)

Prevention and Therapy are Personal
(Personalized Medicine)

- The Right Dose of
- The Right Drug for
- The Right Indication for
- The Right Patient at
- The Right Time.

One Diet fits all?





Out-of-Africa

- 100-200 mil años

Out-of-Africa

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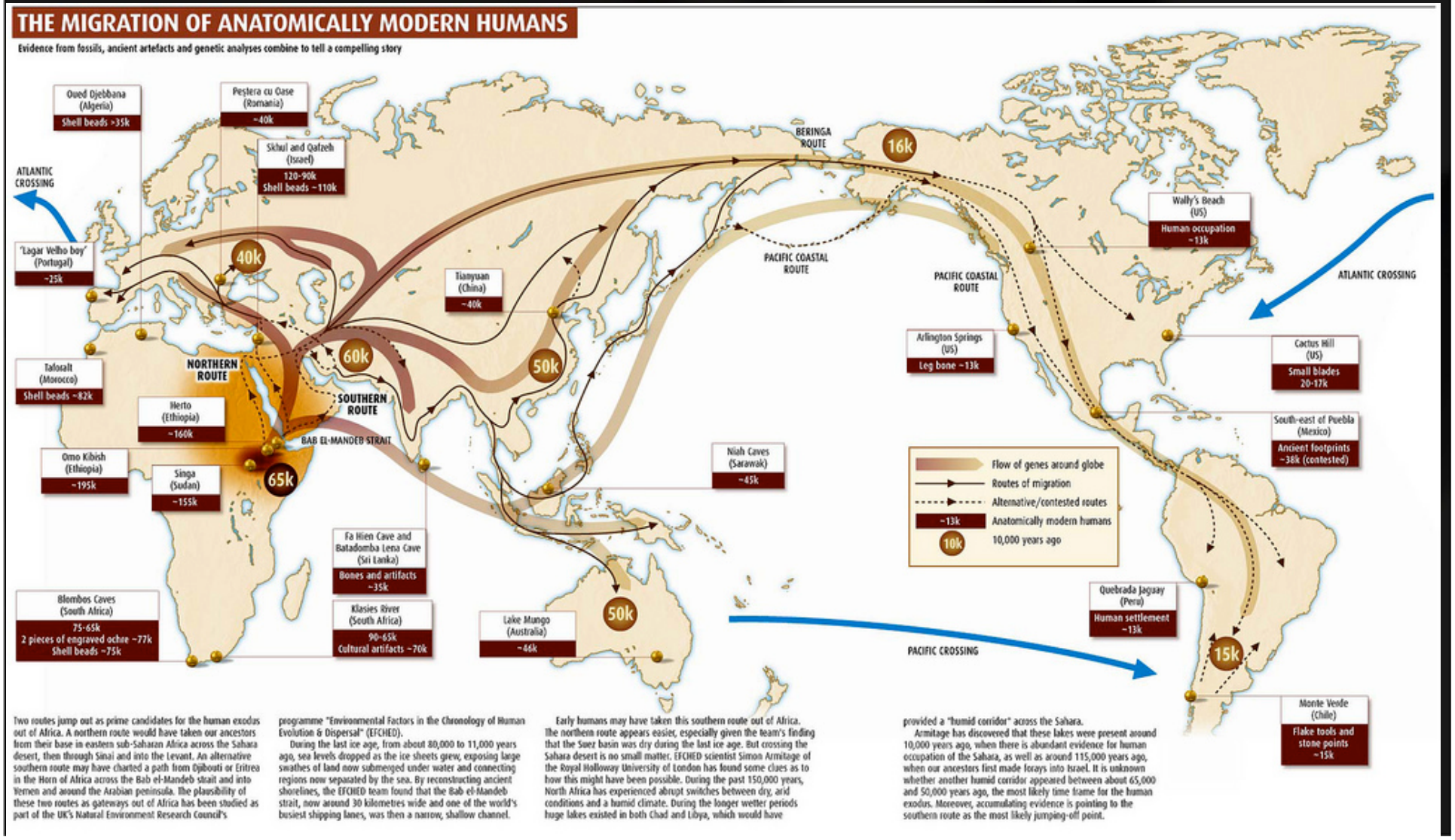
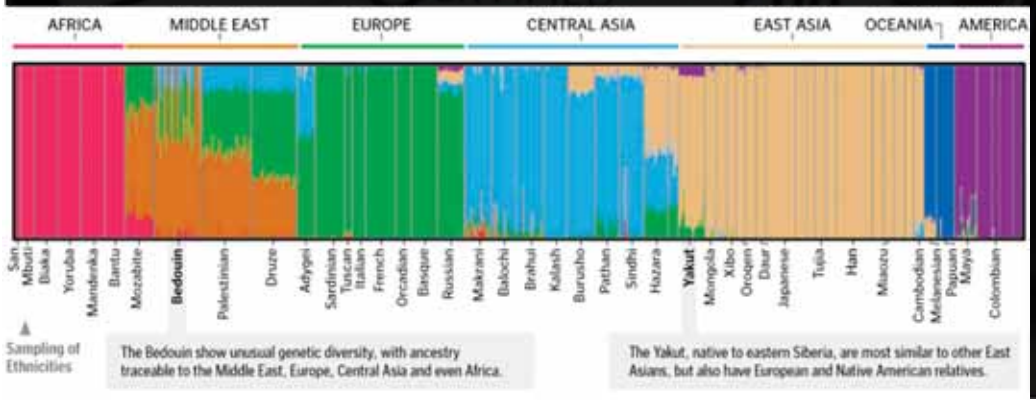


Diversidad Humana

- Somos diferentes!!!!!
- Una de las razones detras de la diversidad esta en las variantes geneticas en nuestros genomas.
- Se estiman unos 10 millones de variantes comunes en la poblacion.




140
160
180

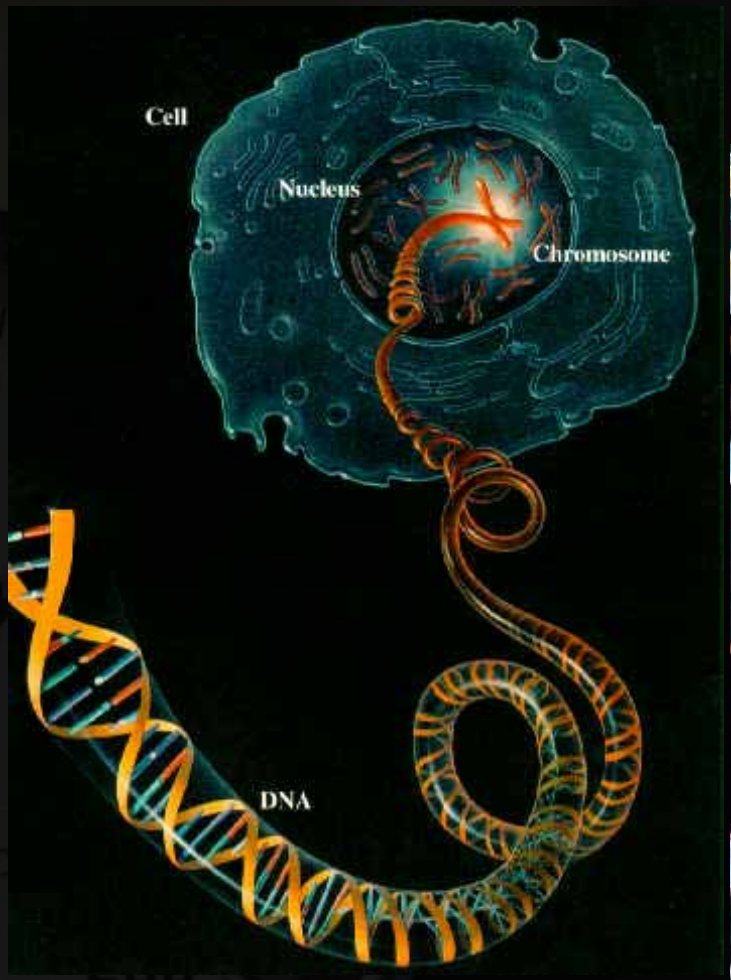
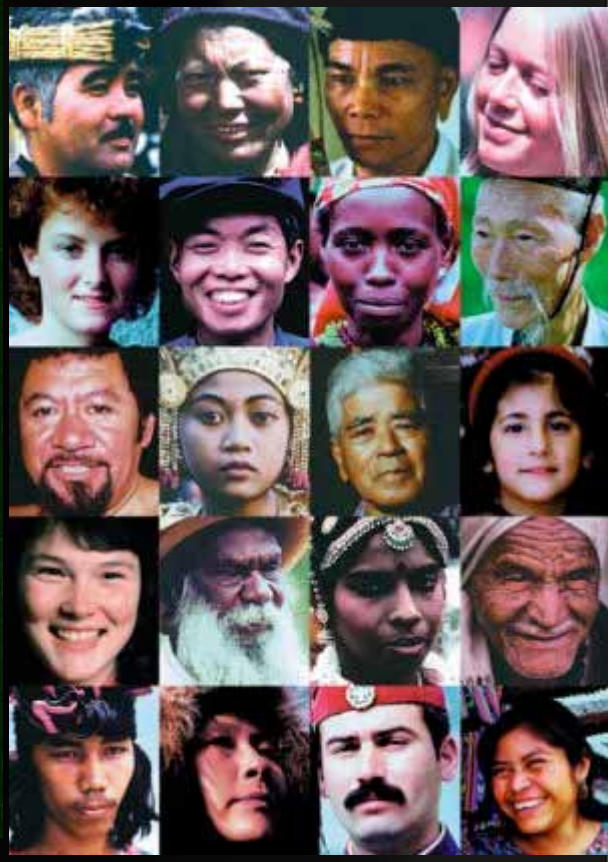
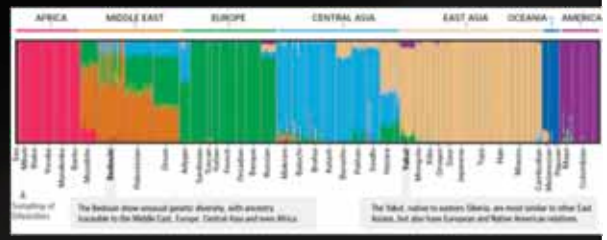











Cell
Nucleus
Chromosome
DNA


AFRICA
MIDDLE EAST
EUROPE
CENTRAL ASIA
EAST ASIA
OCEANIA
AMERICA

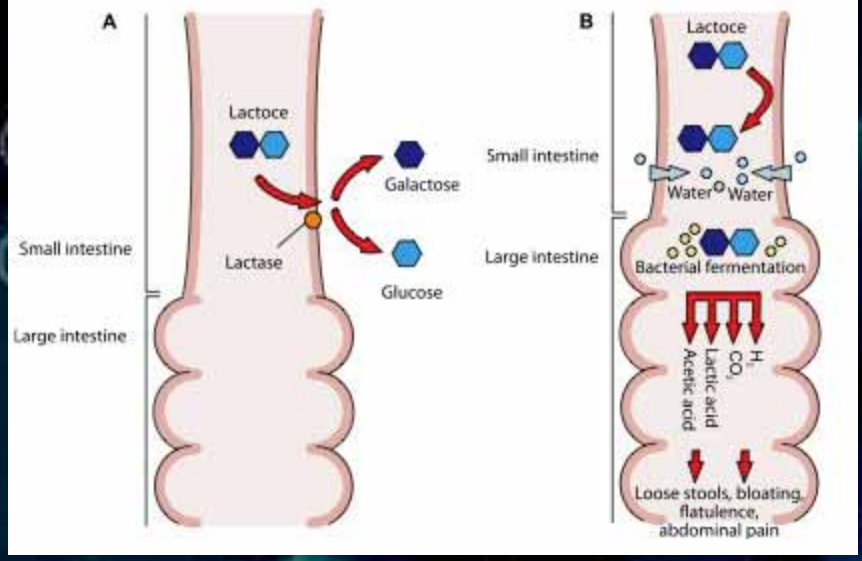
Globalizacion

7000 especies vegetales se producen para alimentacion humana, pero el 50% de nuestros alimentos vienen del trigo, maiz y arroz

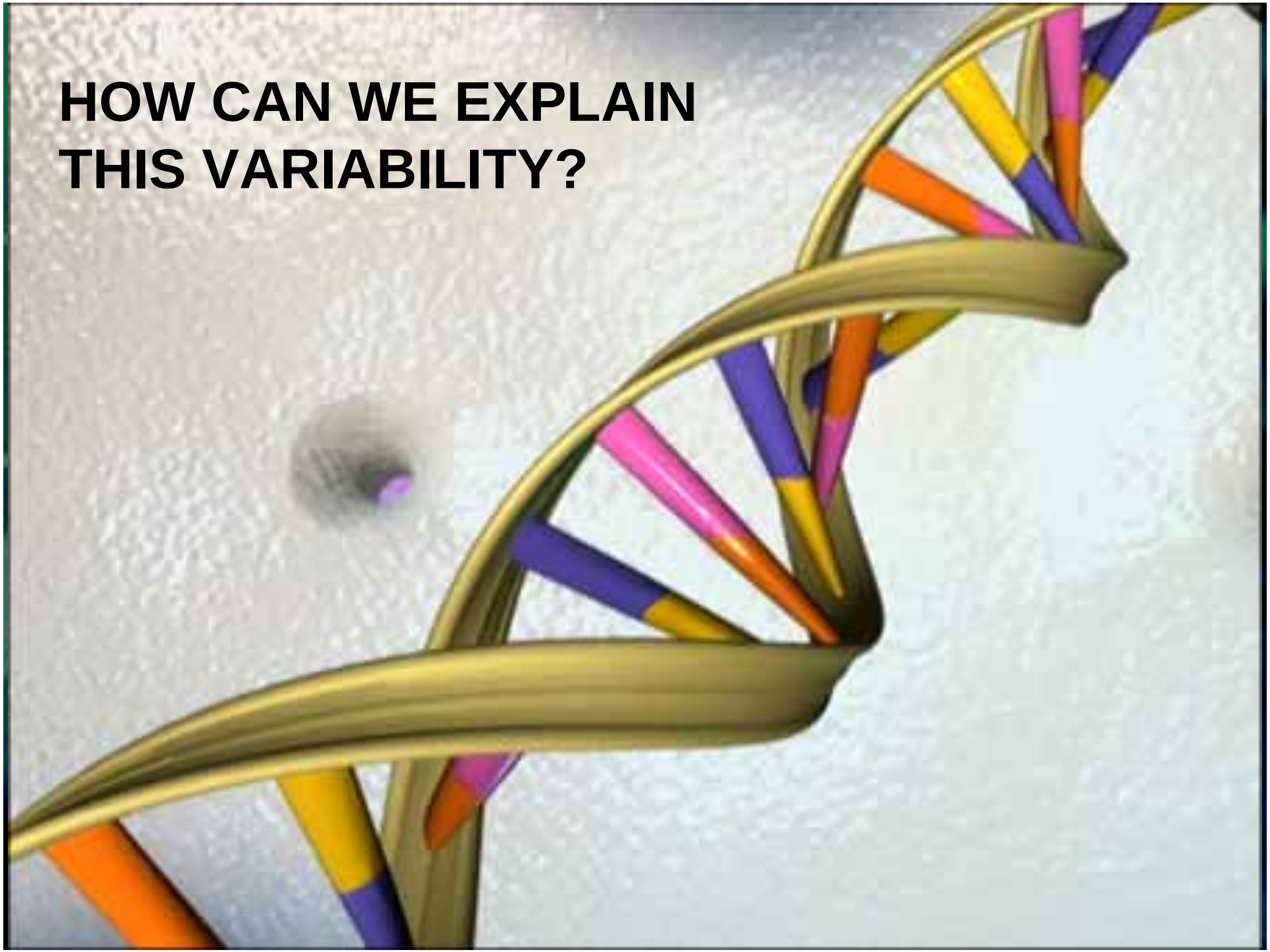
Lactose Tolerance/Intolerance

A. Sufficient Lactase:
   - Lactose degrades lactose.
   - No symptoms of lactose intolerance.

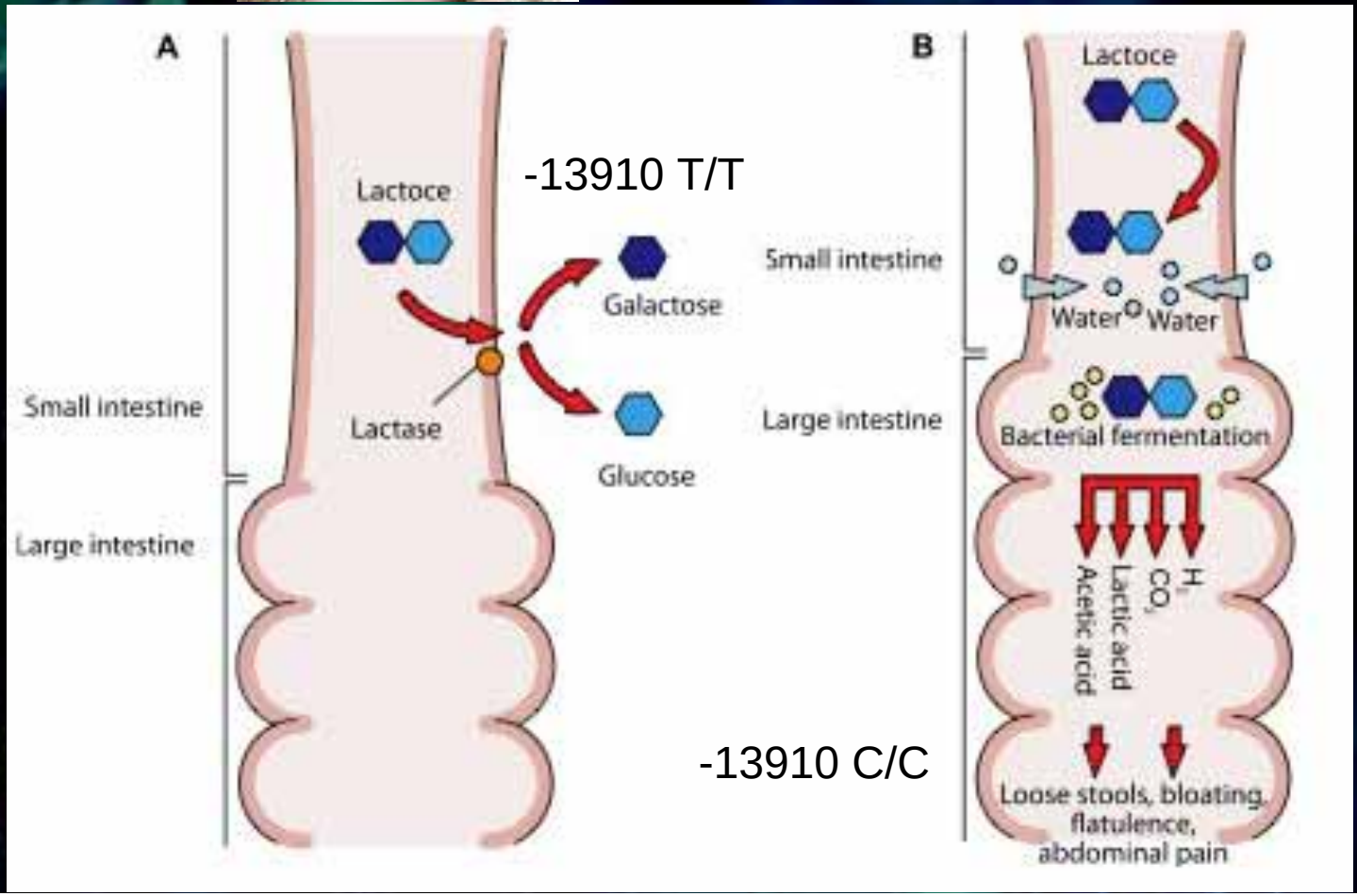
B. Absent or insufficient lactase:
   - Unabsorbed lactose in the large intestine
   - lactose intolerance symptoms
     - Loose stools
     - Bloating
     - Flatulence
     - Abdominal pain



HOW CAN WE EXPLAIN THIS VARIABILITY?



“Simple” Nutrigenomics

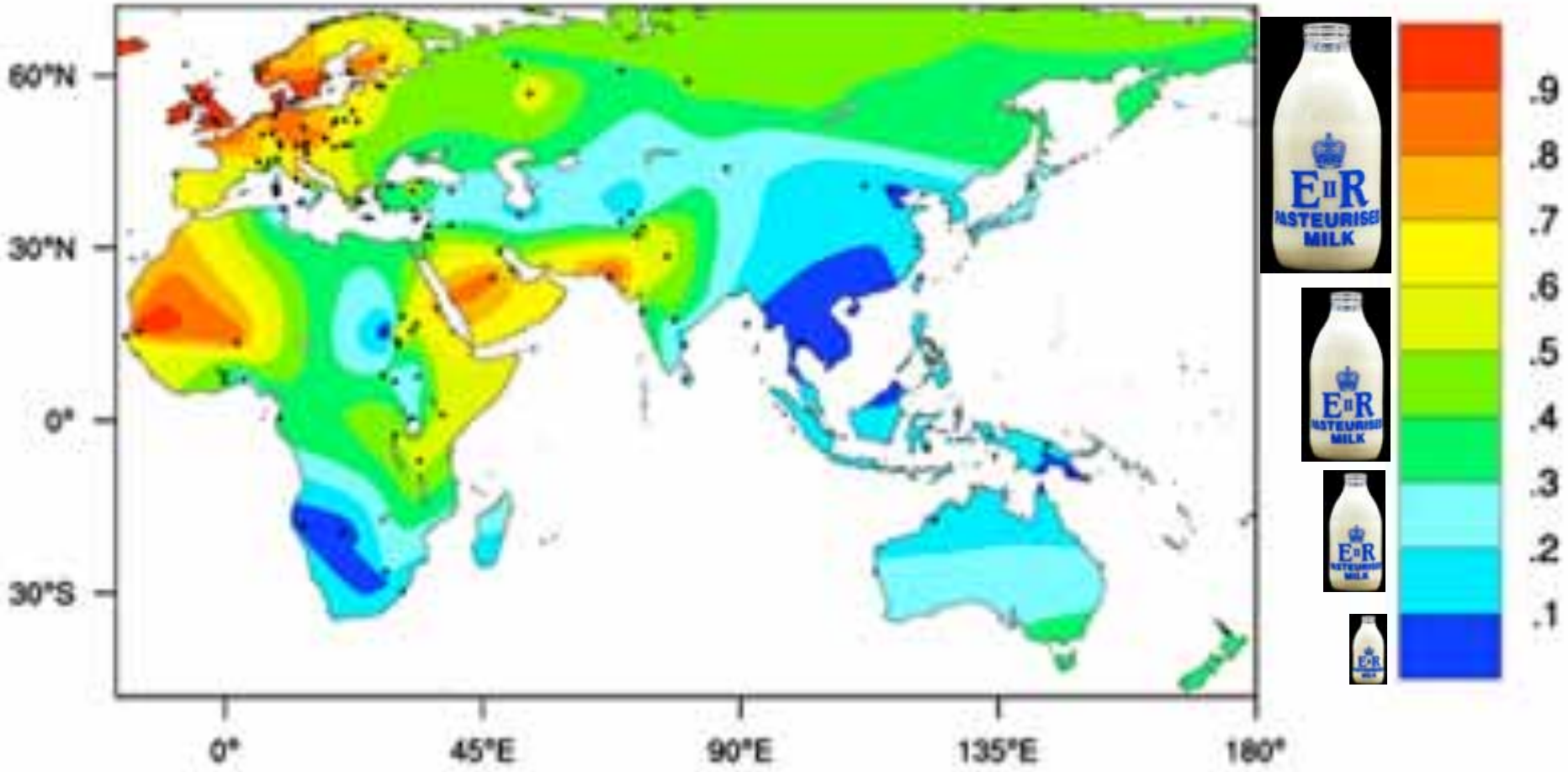


-13910 T/T

-13910 C/C

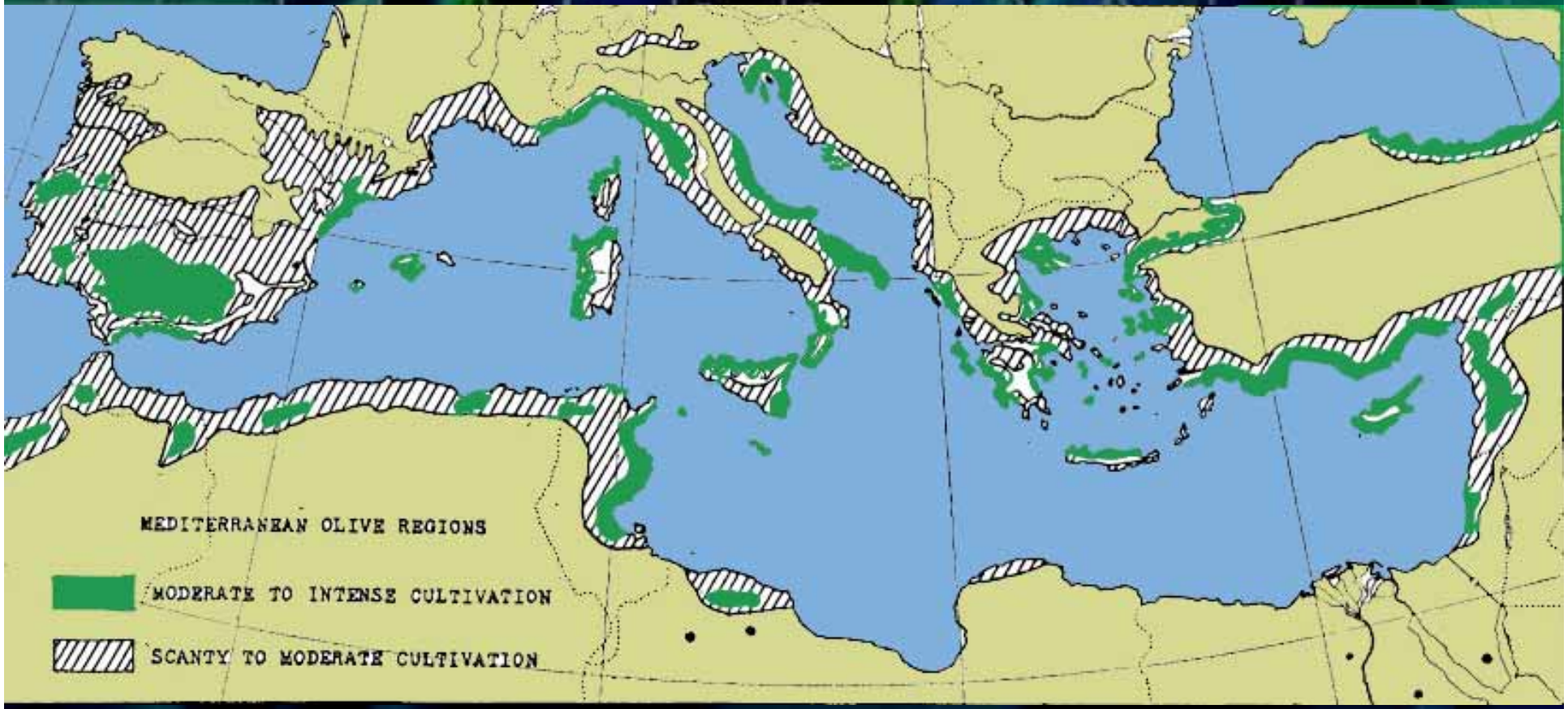
One Size Doesn't Fit All

World Map Lactase Persistence



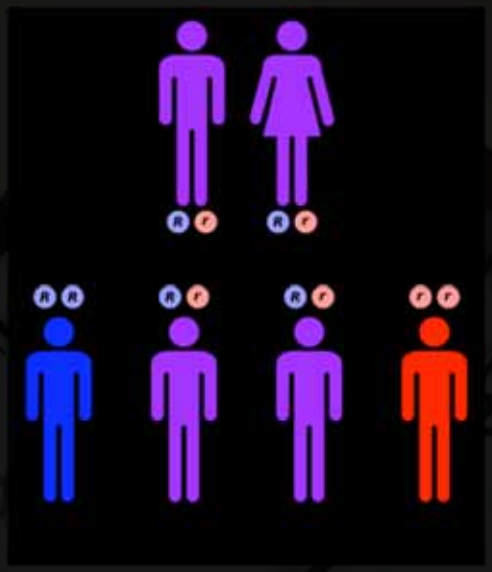
Geographic distribution of lactase persistence matches distribution of dairy farming

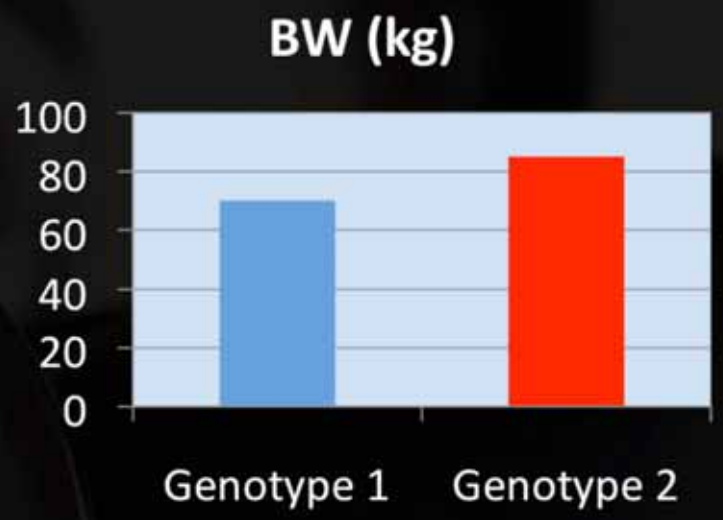
Mediterranean Olive Oil Production (99% World Production)

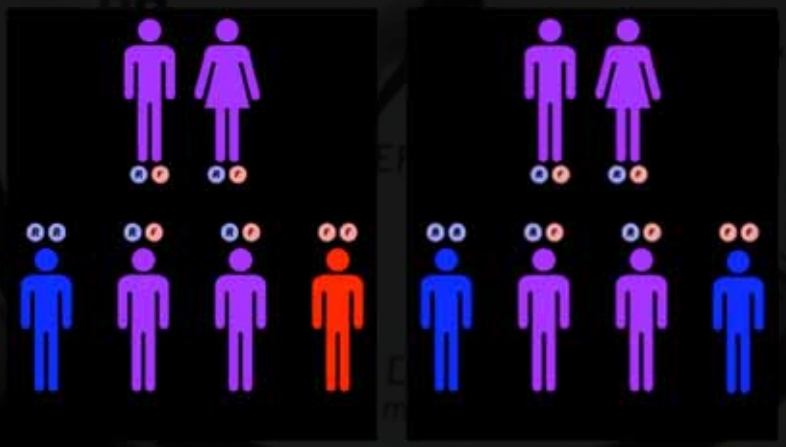


Is There and Olive Oil Preference Gene(s)?

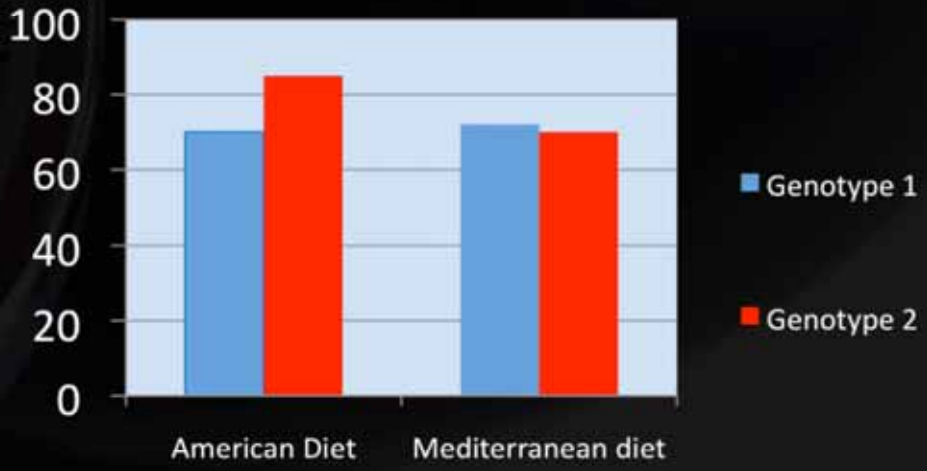
Ejemplo Interaccion Gen-Dieta: Nutrigenomica en Accion







American Diet Mediterranean Diet

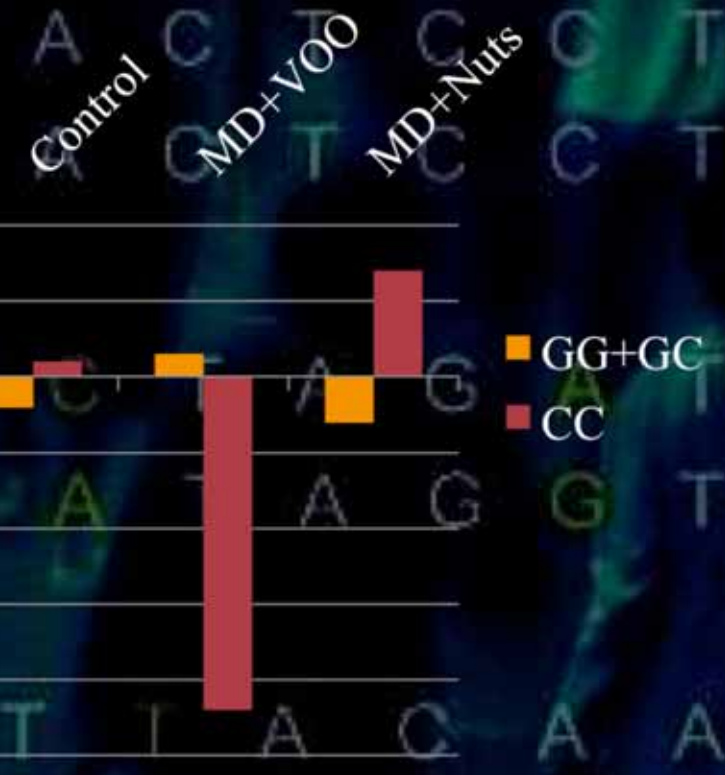


A Mediterranean diet rich in virgin olive oil may reverse the effects of the -174G/C IL6 gene variant on 3-year body weight change

Baseline characteristics according to the genotype for the IL6 SNPS

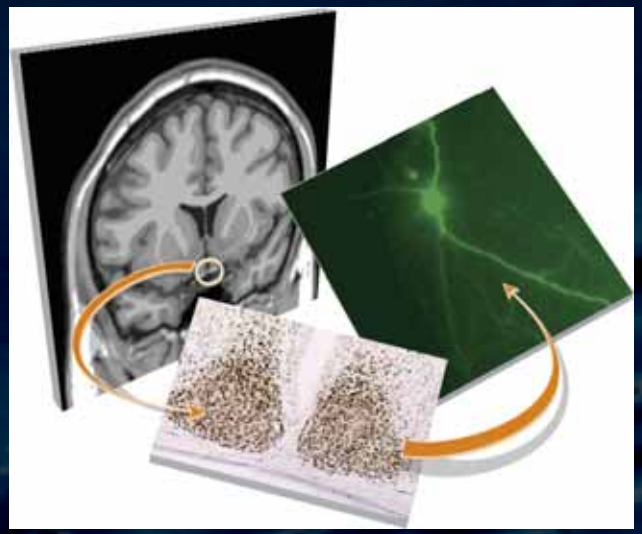
	GG+GC (n=622)	CC (n=115)
Sex (%FEM)	55	54
Age	67.7	68.3
Weight (kg)	74.6	77.2
BMI (kg/m2)	29.1	29.8

Mean Body changes according to IL6 genotype and diet

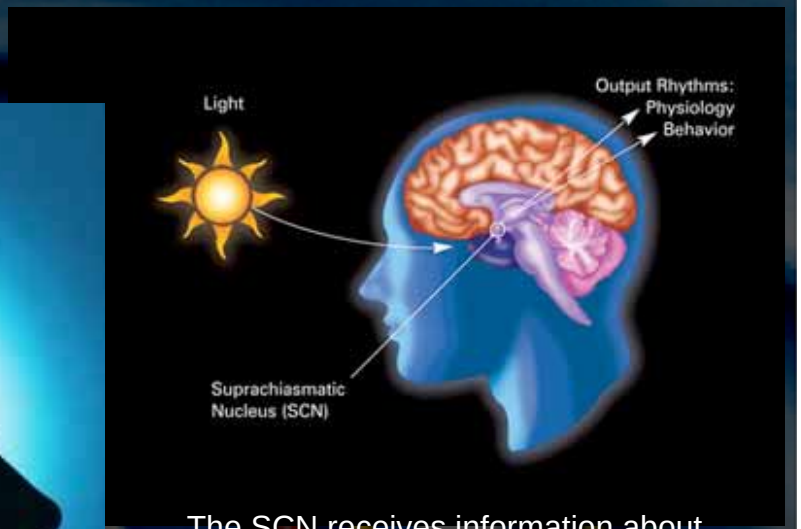


Conclusion: at baseline, CC subjects for the -174G/C polymorphism of IL6 had the highest body weight and BMI. However, after 3 years of nutritional intervention with MD+VOO, these subjects were predicted to have the greatest reduction in body weight.

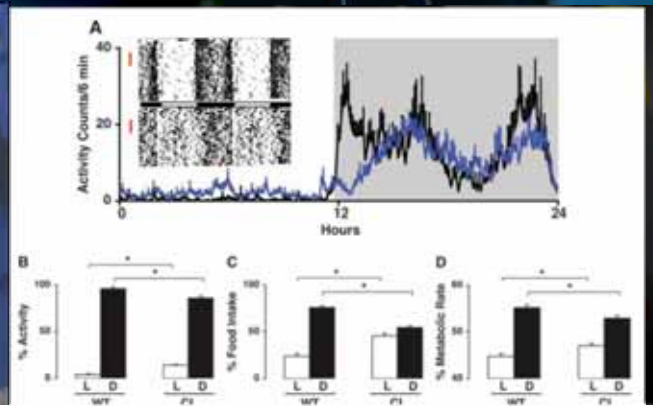
Razquin et al. Mol. Nutr. Food Res. 2010, 54, S75–S82



The primary circadian "clock" in mammals is located in the suprachiasmatic nucleus (or nuclei) (SCN), a pair of distinct groups of cells located in the hypothalamus.

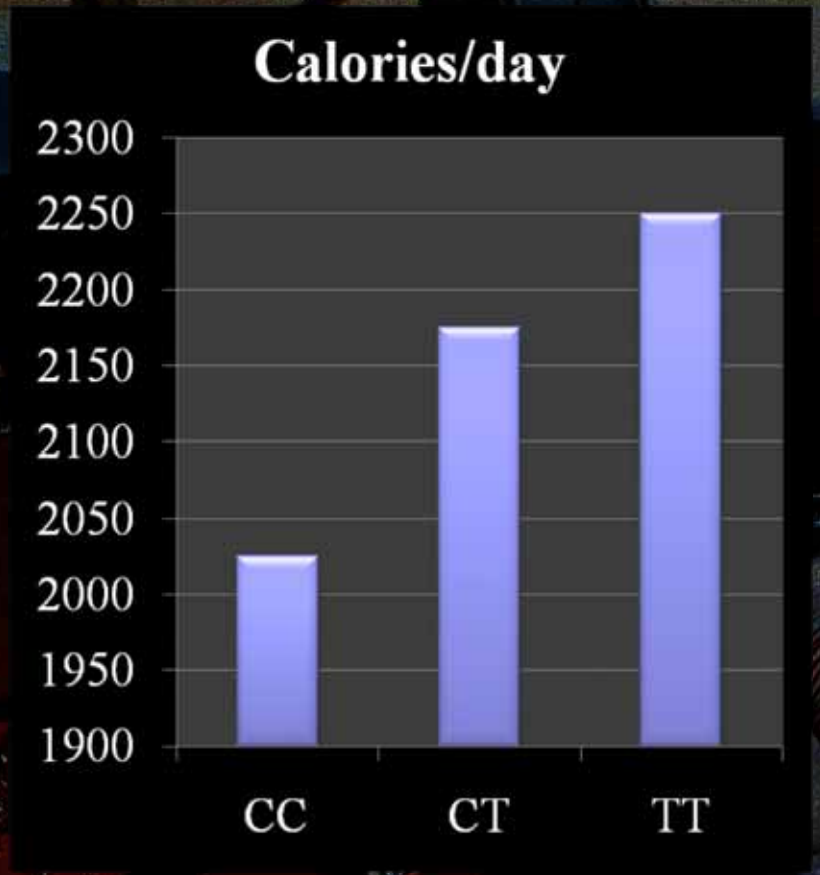


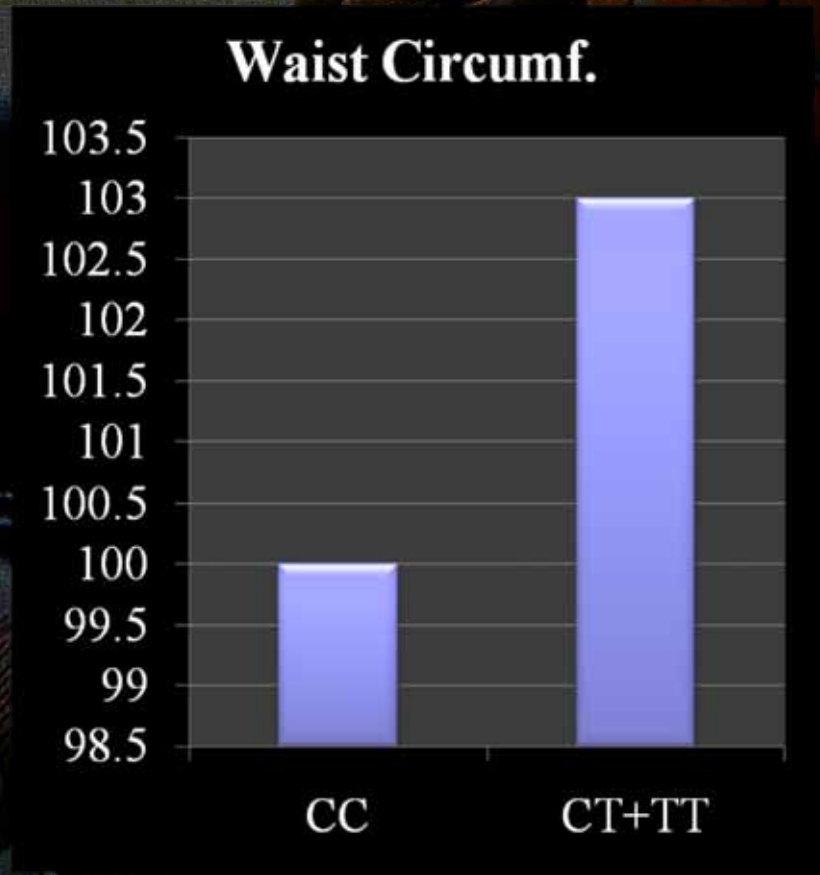
The SCN receives information about illumination through the eyes. The retina of the eye contains "classical" photoreceptors ("rods" and "cones"), which are used for conventional vision. But the retina also contains specialized ganglion cells which are directly photosensitive, and project directly to the SCN where they help in the entrainment of this master circadian clock.



Destruction of the SCN results in the complete absence of a regular sleep–wake rhythm.

Associations between CLOCK SNPs (rs3749474) and dietary intake and obesity parameters.

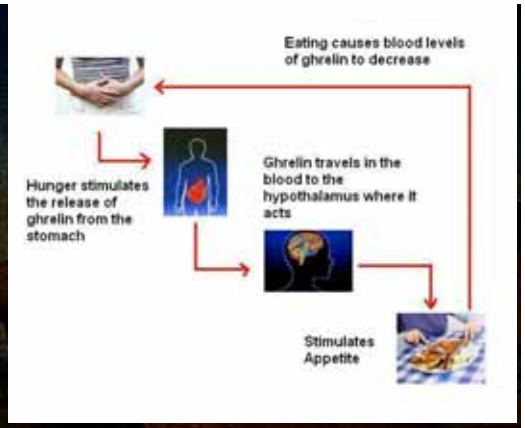




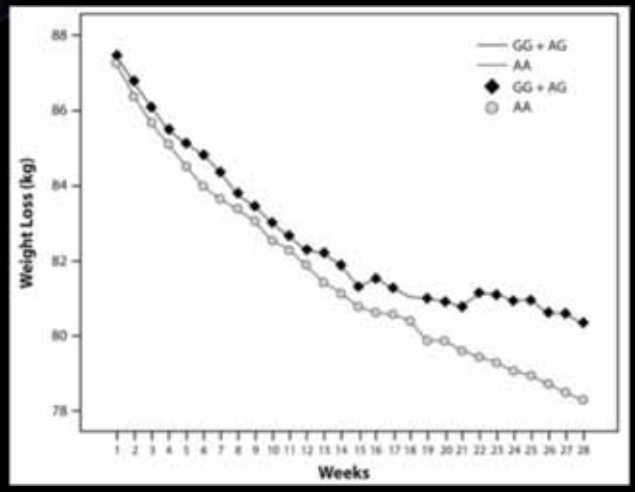
rs3749474 GENOTYPE

Garaulet M, et al. CLOCK gene is implicated in weight reduction in obese patients participating in a dietary programme based on the Mediterranean diet. Int J Obes. 2010;34:516-23.

More on Clock rs1801260



- Population: 1495 overweight/obese subjects (BMI: 25-40 kg/m2) of 20–65 y attending outpatient obesity clinics.
- Results: Significant association between the CLOCK 3111T/C SNP and weight loss, which was particularly evident after 12-14 weeks of treatment.
- Carriers of the minor C allele were more resistant to weight loss than TT individuals.
- Minor C allele carriers had:
  - shorter sleep duration
  - higher plasma ghrelin concentrations
  - delayed breakfast time
  - evening preference
  - less compliance with a Mediterranean Diet pattern



Garaulet M, et al. Int J Obes. 2010;34:516-23.

El Futuro de la Prevencion Personalizada

Consulta Inicial

Toma de muestra

Aislamiento ADN

Analisis ADN

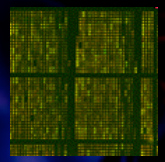
Consultas
Actualizacion

Entrega
resultados

Consulta resultados y
recomendaciones

Analisis
Bioinformatico

Take Home Messages



- Genomic-based tests will allow early risk detection for CVD and other age-related diseases.

- For those at low genetic risk, the nutritional advice should include a dietary pattern consistent with local traditions.

- For those at high genetic risk, a more targeted (personalized), nutrigenomic/pharmacogenomic approach could be used to quench most of the genetic predisposition.

- Whereas the technology and scientific knowledge needed to achieve these goals is moving rather quickly, we still need to generate a new generation of health professionals able to translate and deliver this information to the population

- We need to Identify points of convergence of the government and academics research with pharma, diagnostic and food and drinks markets which may offer new opportunities for co development and translation and to avoid the “snake oil” syndrome.

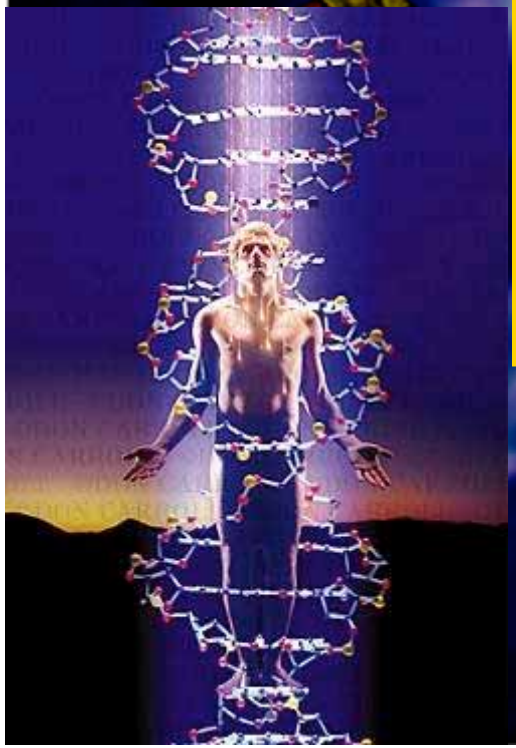
TUFTS HNRCA

Healthy Aging

THROUGH NUTRITION RESEARCH

JEAN MAYER USDA HUMAN NUTRITION RESEARCH CENTER ON AGING

http://hnrc.tufts.edu



Thanks for your attention!