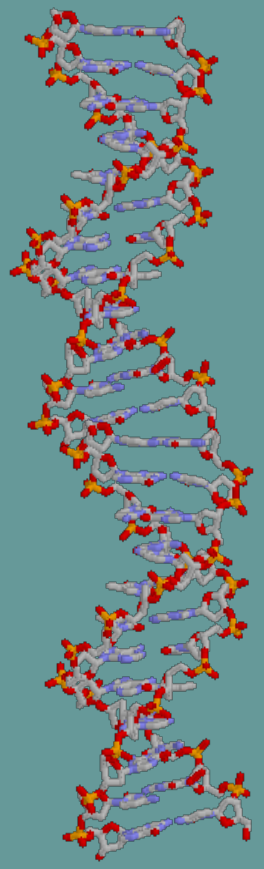


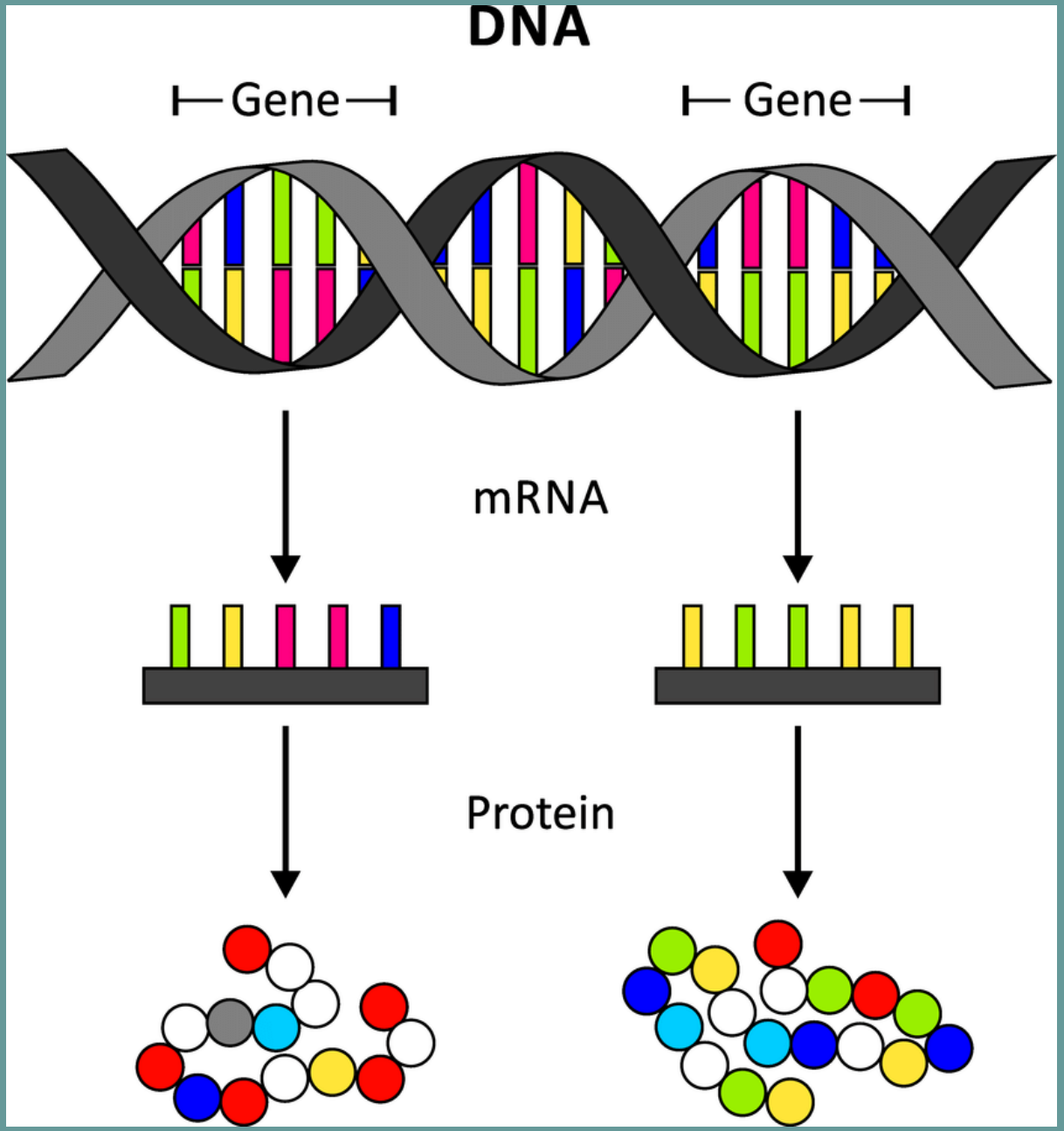
Beslenme ve DNA üzerine Etkileri

Dr Fatma Savran Oğuz

- DNA'nızın dizilimi değişebilir,
- Beslenme şekliniz DNA'nızda kodlanan olasılıkları nasıl "ifade ettiğiniz" üzerinde çok önemli bir etkiye sahiptir.





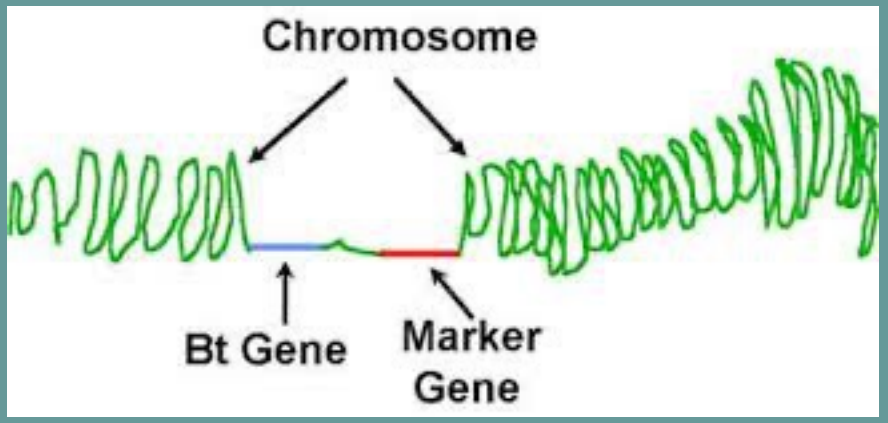

DNA
Gene
Gene
mRNA
Protein

Tükettiğiniz gıdalar,

sağlığınız için önemli - ve hatta ölüm kalım - rol oynayan belirli genetik belirteçleri açabilir veya kapatabilir.



Genetik Belirteç

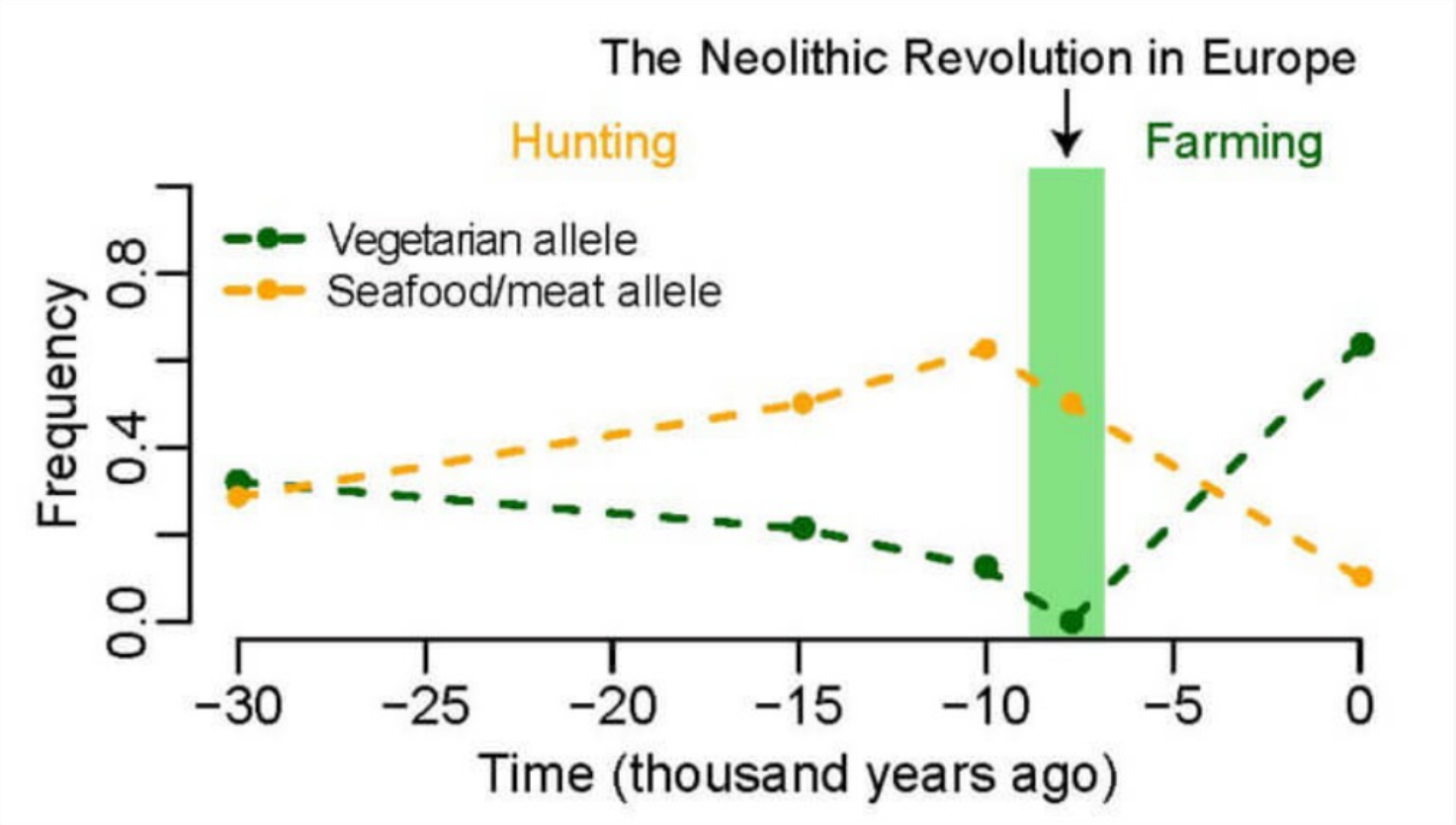


- Genetik belirteç, bir kromozom üzerinde fiziksel konumu bilinen bir DNA dizisidir.
- Genetik belirteçler, kalıtsal bir hastalığı sorumlu genle ilişkilendirmeye yardımcı olabilir.
- Genetik belirteçler, henüz tanımlanmamış ancak yaklaşık konumu bilinen yakındaki bir genin kalıtımını izlemek için kullanılır.
- Genetik işaretleyicinin kendisi bir genin parçası olabilir

From meat to veggies: Genetic markers tell us European diets shifted 8,000 years ago

Krishna Ramanujan | Futurity | June 14, 2017





This graphic shows the frequency of a vegetarian allele and a seafood/meat allele, two versions of the same gene, over the past 30,000 years in European populations. The trends were opposite for the two alleles and both took a turn after the Neolithic revolution. Credit: Kaixiong Ye/Cornell.

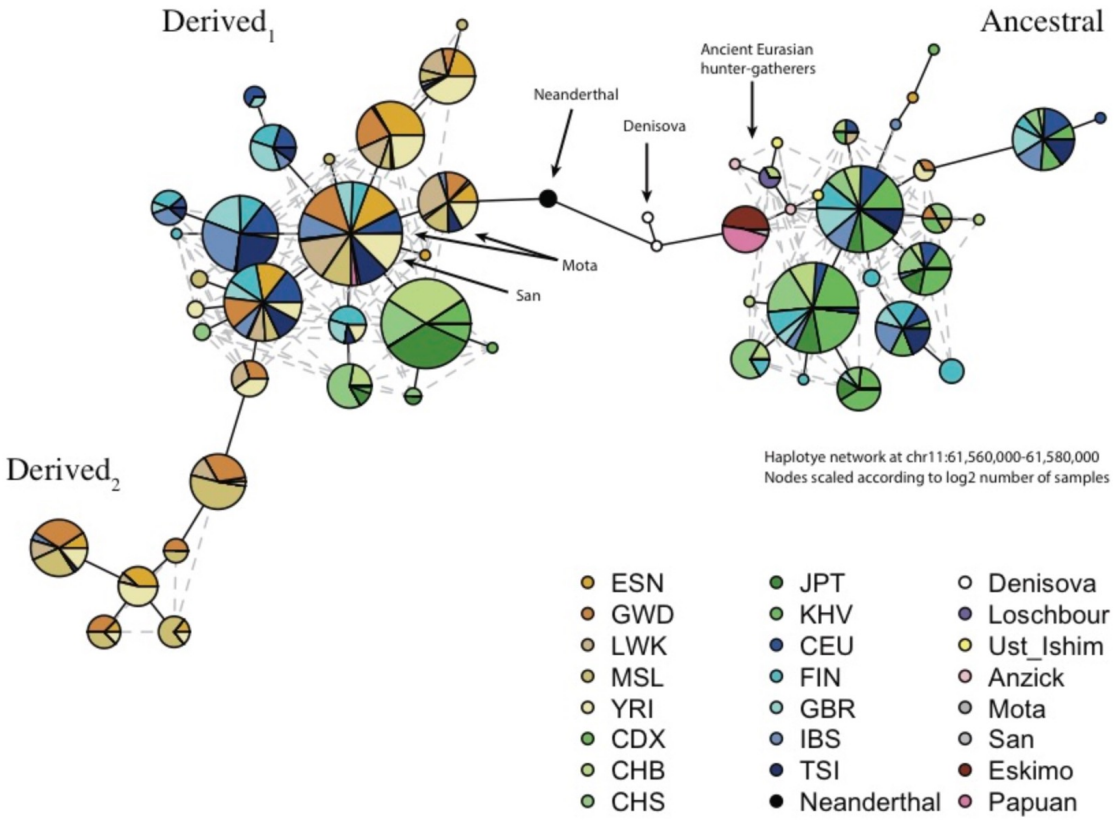
Published: 26 May 2017

Dietary adaptation of *FADS* genes in Europe varied across time and geography

Kaixiong Ye, Feng Gao, David Wang, Ofer Bar-Yosef & Alon Keinan

Nature Ecology & Evolution **1**, Article number: 0167 (2017) | Cite this article

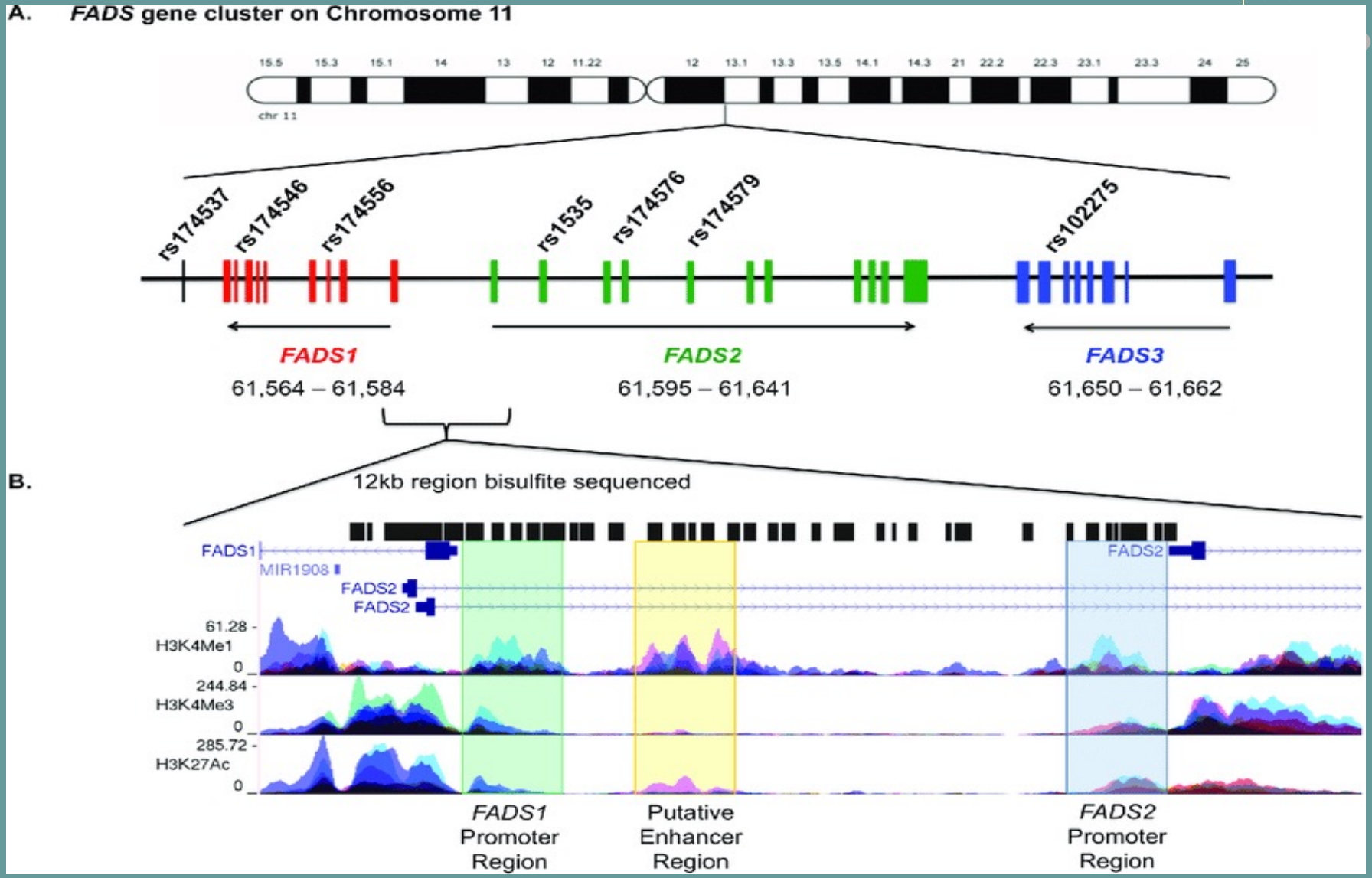
- Yağ asidi desatüraz (FADS) genleri, bitki bazlı gıdalardan uzun zincirli doymamış yağ asitlerinin sentezi için gerekli olan enzimleri kodlar.
- Uzun Zincirli Çoklu Doymamış Yağ Asitleri fizyolojik süreçlerde çok önemlidir
- Bu biyosentez, LCPUFA bakımından fakir diyetlerle / bitki bazlı) beslenen bireyler için gereklidir.
- Beyin gelişimi için önemli olan bu yağ asitleri alternatif olarak doğrudan et ve balıktan da elde edilebilir.



Here, African haplotypes are in brown, European haplotypes are in blue and East Asian haplotypes in green. It looks like there are actually two major clusters of derived haplotypes - one which is African-specific and one which is shared with Eurasians. Note that all the inuit (from the SGDP) have the ancestral allele.

Variable selection depending on diet

Kromozom 11 üzerinde yan yana bulunan FADS1 ve FADS2'nin,
birçok farklı popülasyonda görünüşe göre bağımsız olarak seçilim altında olduğu tespit edilmiştir
Bu değişen seçilim modelleri, değişen diyetlerin antropolojik kanıtlarıyla ve tarıma uyarlanabilir alellerin daha yüksek FADS1 ekspresyonu ve dolayısıyla gelişmiş LCPUFA biyosentezi ile ilişkilendirilebilir


A.
FADS gene cluster on Chromosome 11
chr 11
rs174537
rs174546
rs174556
rs1535
rs174576
rs174579
rs102275
FADS1
61,564 – 61,584
FADS2
61,595 – 61,641
FADS3
61,650 – 61,662
B.
12kb region bisulfite sequenced
FADS1
MIR1908
FADS2
FADS2
FADS2
61.28
H3K4Me1
0
244.84
H3K4Me3
0
285.72
H3K27Ac
0
FADS1 Promoter Region
Putative Enhancer Region
FADS2 Promoter Region

Beslenme – lezzet



USA TODAY · TUESDAY, OCTOBER 14, 2003 · 7D

Obesity predicted for 40% of America

By 2010, if weight isn't reined in

By Nanci Hellmich
USA TODAY

About 40% of Americans, or 68 million people, will be obese by 2010 if people keep gaining at the current rate, government researchers predict.

About 31% of Americans are now obese, which is defined as roughly 30 or more pounds over a healthy weight.

Scientists with the Centers for Disease Control and Prevention present their predictions this week in Fort Lauderdale at the annual meeting of the North American Association for the Study of Obesity, co-sponsored with the American Diabetes Association.

Being overweight increases the risk of diabetes, heart disease, cancer, arthritis and other health problems. Federal officials hoped to decrease obesity in the USA with Healthy People 2010, a national health-promotion and disease-prevention initiative. One major objective is an obesity rate of 15%.

But the trend is headed in the opposite direction. To come up with the latest projections, researchers tracked data from the mid-'70s through 2000 with the National Health and Nutrition Examination Survey. It is considered the most definitive assessment of Americans' weight.

Obesity is "a complex problem that will require renewed efforts by individuals, health care professionals, communities and policymakers to create a more comprehensive solution," says CDC health economist Larissa Roux.

Another report, released today by the Rand Corp., found that the number of severely obese people (100 or more pounds over a healthy weight) increased from one in 200 in 1986 to one in 50 in 2000. More than 4 million U.S. adults are in this category, says Roland Sturm, a senior economist.

John Foreyt, director of Behavioral Medicine Research Center at Baylor College of Medicine in Houston, estimates that almost every American will be overweight or obese by 2040.

A few, possibly 5% to 15%, might able to maintain a healthy weight, he says.

"But most of us are in trouble," Foreyt says. "We are affected so strongly by the environment — fast food, big portion sizes and the lack of a need to be active — that we are doomed."

Samuel Klein of the North American Association for the Study of Obesity says, "More lives are being lost to obesity than any war or terrorist attack."

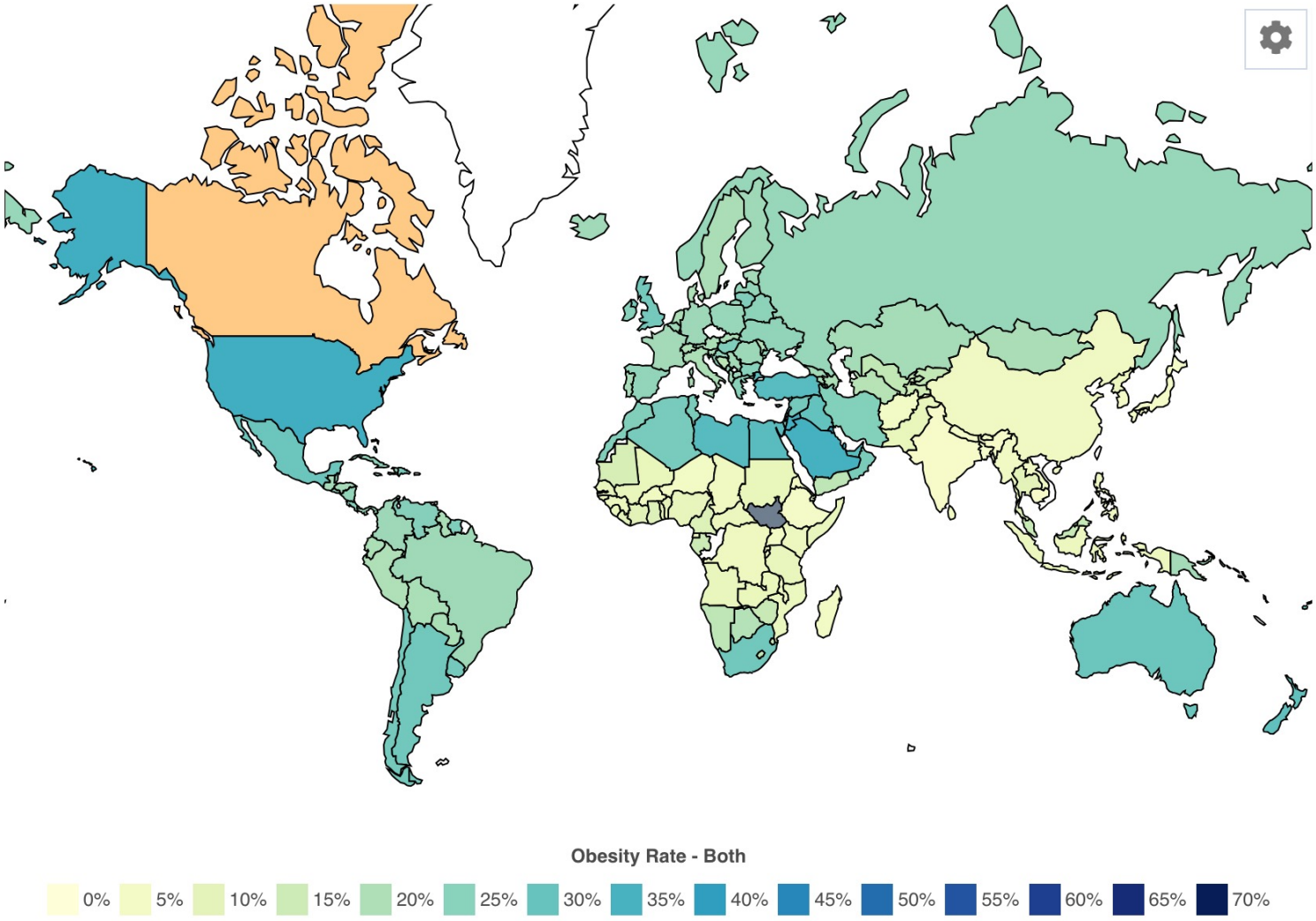
Obesite

Vücut yağ kitlesinin, yağsız vücut kitlesine oranla artması ile karakterize olan kronik bir hastalıktır.



- Tüm dünyada sıkça kullanılan obezite ölçütlerinden biri Beden Kitle İndeksi ya da BMI'dır.
- 1830'larda ortaya atılan bu ölçü, kişinin boyuna oranla kilosunu dikkate almaktadır.
- 18.5 - 24.9
- 30 veya  BKI obez olarak kabul edilir.

Most Obese Countries 2023



Top 10 most obese countries in the world, according to WHO

The World Health Organization (WHO) **conducted a study** on obesity in 200 countries. The institution collected data based on surveys from national health ministries. As per WHO, the top 10 most obese countries are:

1. American Samoa
2. Nauru
3. Cook Islands
4. Tokelau
5. Tonga
6. Samoa
7. Palau
8. Kiribati
9. Marshall Islands
10. Kuwait

All these countries have an adult obesity rate of above 60%. Yes, more than half of their adult

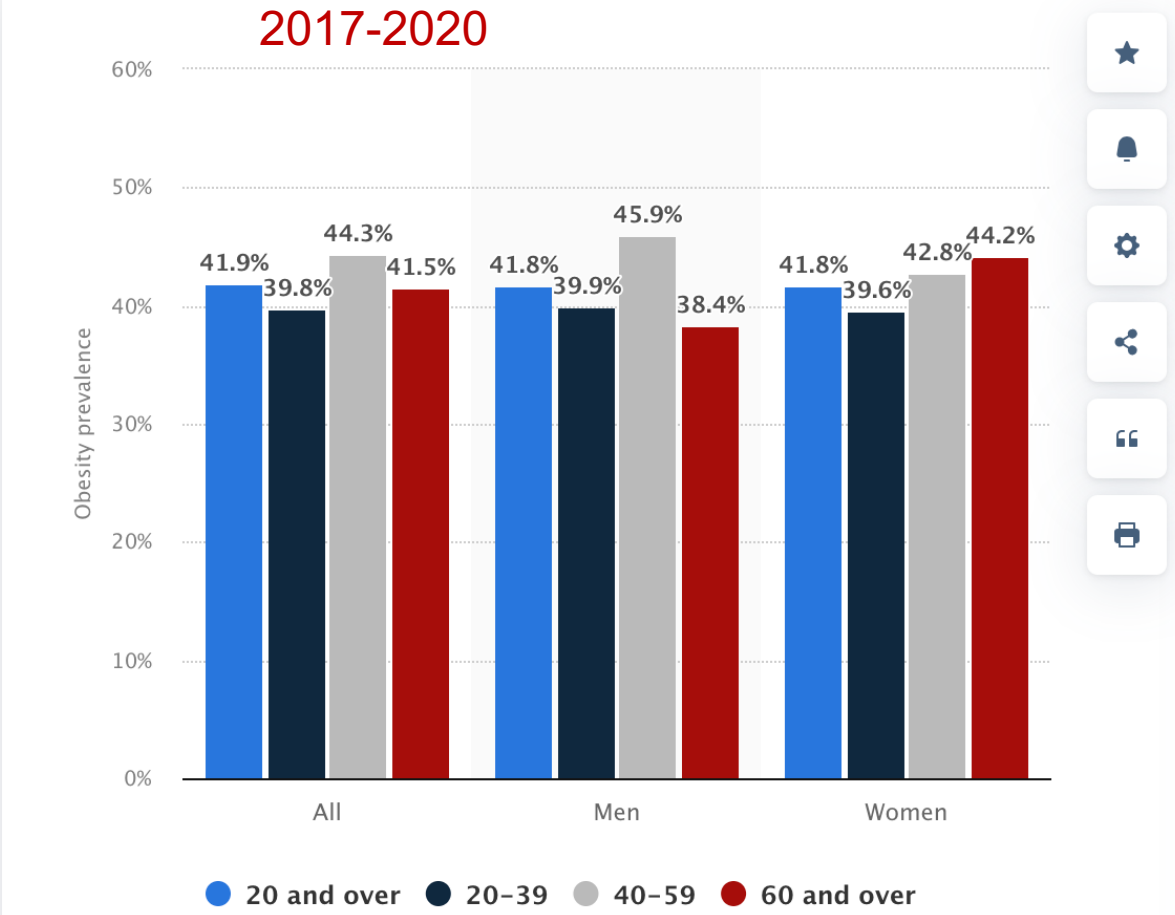
All these countries have an adult obesity rate of above 60%. Yes, more than half of their adult population is obese and almost their entire adult population is overweight. For instance, American Samoa located in the South Pacific has an obesity rate of 74.6%! Other than Kuwait (which is in the Middle East), all the nations are located in the South Pacific.

The weight of adults in the South Pacific region is in increasing 4x faster than the global average. Some experts argue people in the region are genetically predisposed to obesity. But other studies have **pointed out** that the eating habits of locals were influenced by the colonial settlers, which caused them to gain weight.

These are the most obese countries with the highest proportion of obese people. But they are tiny nations with small populations. So, obesity in these nations doesn't have much impact on the total number of obese people on the planet. More than 50% of the world's obese population lives in a handful of countries like the US, the UK, Mexico, Germany, Brazil, Chile, and Turkey.



Obesity prevalence among U.S. adults from by gender and age group



© Statista 2023

Additional Information

Show source


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Toperfect Art

Obesiteye yatkınlık genleri var mıdır?



“I found one! I found one!”

Kenneth M. Weiss & Joseph D. Terwilliger
nature genetics • volume 26 • October 2000

İnsanlarda genetik etkinin kanıtı

- Obez Aileler
- İkiz çalışmaları
  -MZ ve DZ ikiz çalışmaları
- Aile çalışmaları
  - “istatistik model” oluşturulup genetik etki araştırılıyor



Aday Genler ve tek gen hastalıkları ve kromozomal yerleşimi

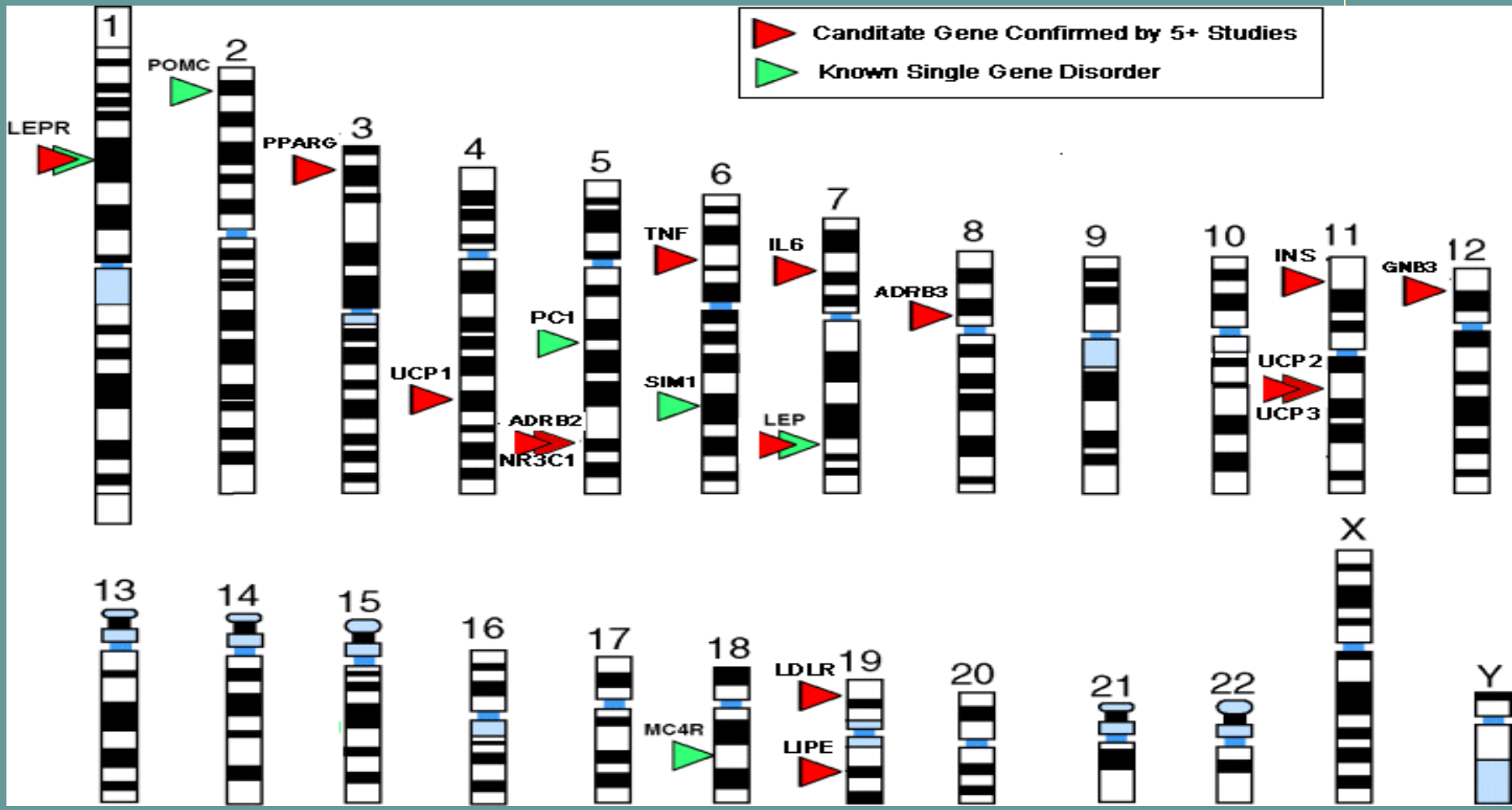
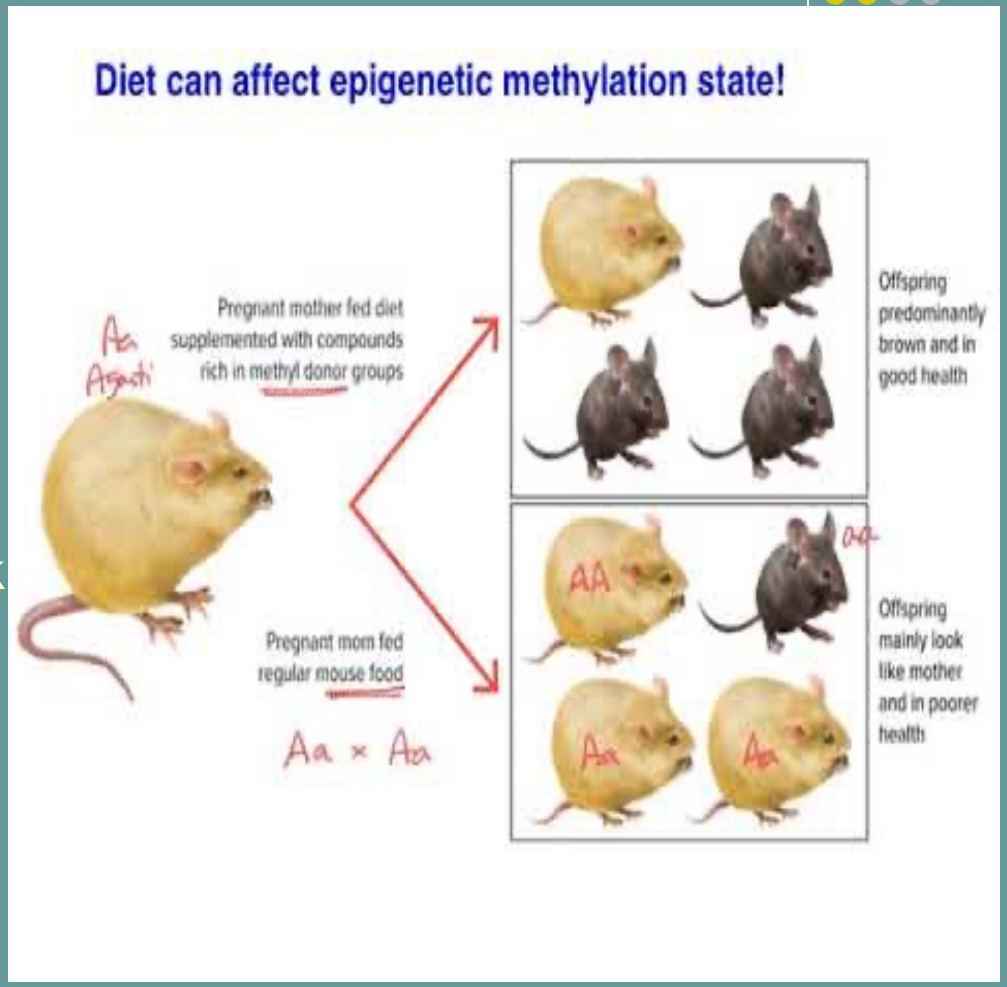


Image adapted from:
Loos, R. J. and C. Bouchard (2003). J Intern Med **254**(5): 401-25.

- Farede bulunan ilk gen “Agouti” geni
- Obesite fenotipi yaratan bu mutasyon dominant olup, sarı tüy ve doğrusal büyüme artışına neden oluyor
- Diğer mutasyonlar resesif olup, beraberinde endokrin ve metabolik disfonksiyonlara neden oluyor

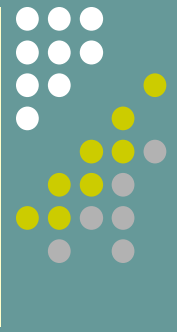


Besin Alım Regülasyon Yolağı



- İnsanlarda fare obesite genleri ile homolog genlerde aynı metabolik yolakta etkili genlerde mutasyon tanımlanmışlardır.
- Leptin ve leptin reseptörleri
- Propimelanokortin (PDMC)
- Melanokortin 4 reseptörü (MC4R)
- Prokonvertaz 1 enzimi kodlayan gen (PC1)

insülin direnci, metabolik sendrom yatkınlık sağlayan genler



- db geni
- Fat (yağ) geni (4q21)
- Tubby (tub) geni (11p15)
- Agoutti geni- homoloğu (20q11.2)
- Diyabet-obezite geni (1p31)
- Obezite (Ob) geni (7q31.3) gen ürünü leptin
- leptin geni (LEP) G-2548A ve leptin reseptör geni (LEPR) 668A>G (Q223R)

- İnsanlarda konjenital leptin eksikliğinin obeziteye neden olduğu 1997 yılından beri bilinmektedir.

- 1997 yılında, Pakistan'lı bir ailenin iki çocuğunda, erken başlayan obezite, hiperfaji, hiperinsülinemi, hipotermi, ileri kemik yaşı ve konjenital leptin eksikliği saptanmıştır.

- Obezitede asıl sorunun leptin eksikliğinden çok leptin rezistansı olduğunu düşündüren bulgular vardır ve leptin rezistansı sıklıkla insülin rezistansı ile birliktedir

- Leptin, ob geninin bir hormonal ürünü olup gıda alımı, enerji sarfı ve vücut ağırlığı regülasyonunda rol alır.
- Leptin geni yağ dokusu, gastrik epitelyum ve plasentada "eksprese" olur.
- FSH, LH, ACTH, kortizol ve GH sekresyonlarını da etkilemektedir
- Plazma leptin konsantrasyonları, vücut yağ miktarı ile korelasyon gösterir;
- obezitede artar, anoreksiya nervozada azalır.

- Homozigot taşıyıcılar,
- hayatın ilk haftalarında başlayan, hiperfaji, hipogonadotropik hipogonadizm
- santral hipotroidizmin eşlik ettiği bir obezite fenotipi gösterirler.

- Leptin Reseptör mutasyonu

Nutrigenomik

Genomik ve beslenme ilişkisi



- Amaç: Sağlığı Korumak, hastalıkları önlemek

- Özel diyet ve yaşam stili

Nutrisyonel faktörlerin rolü

Nutrisyonel faktörler

↓

Transkripsiyon faktörleri

↓

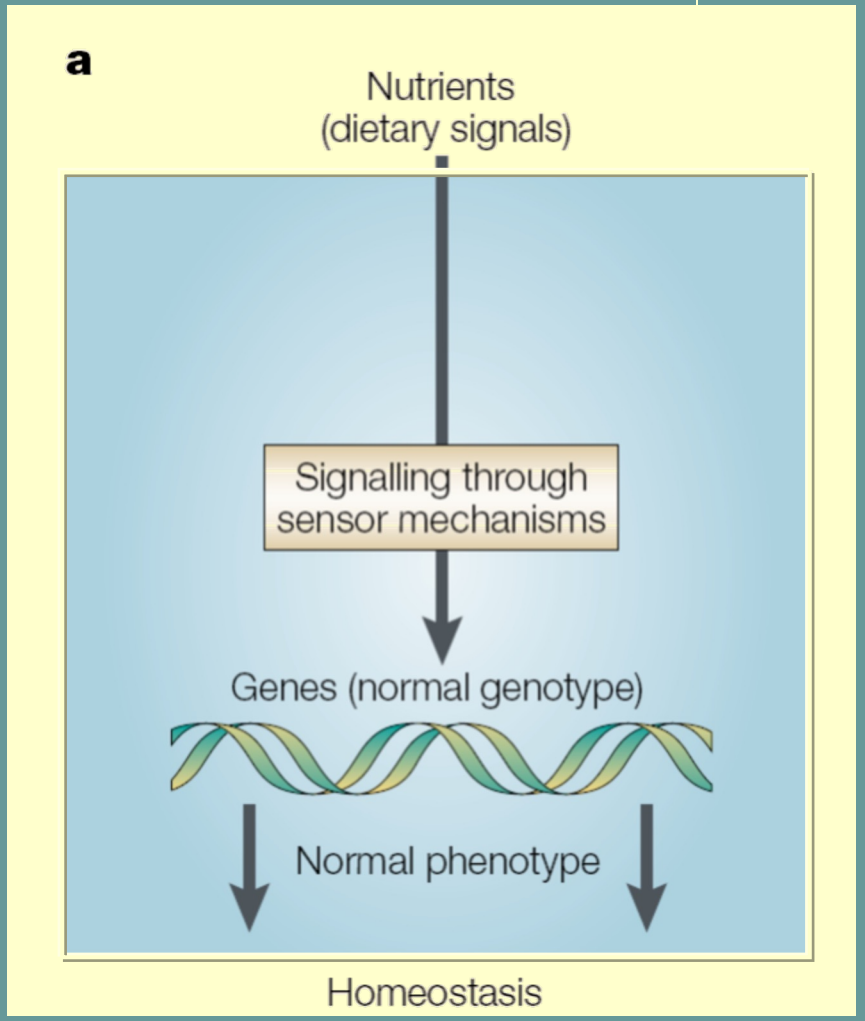
Gen transkripsiyonu

↓

Energy hemoztazı

Hücre proliferasyonu

Besin absorpsiyonu



“Moleküler Nutrisyon ve genomik

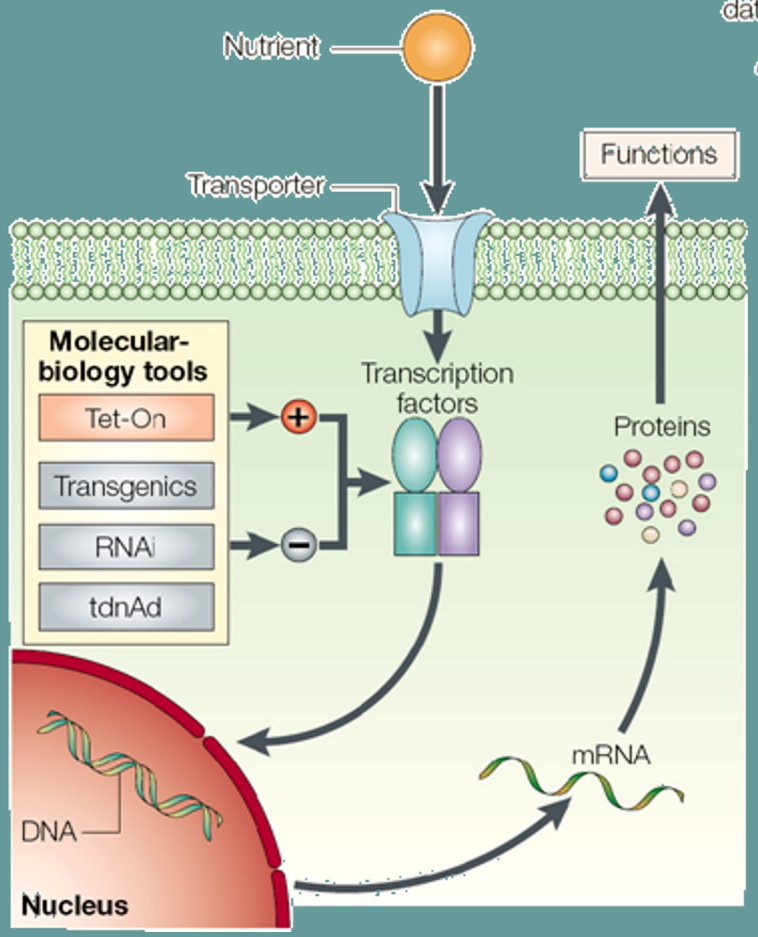


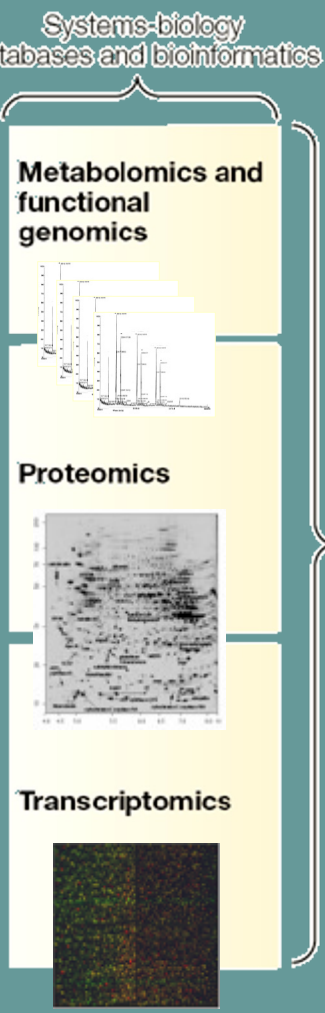
50000 (?) metabolit

80-100000 protein

100000 transkript

20000 gen



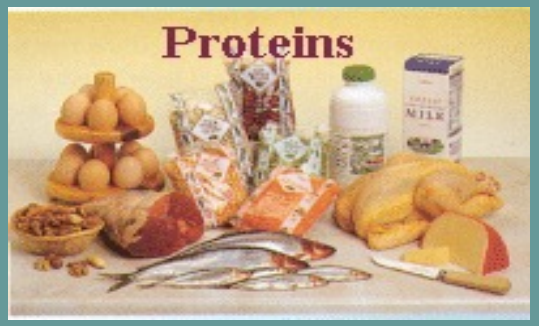


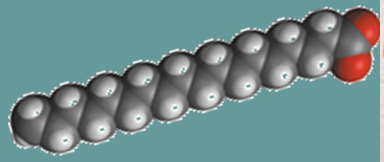


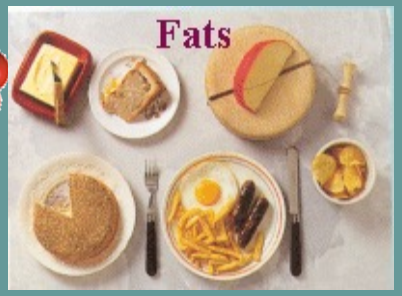
‘Molecular biomarkers’ mechanisms and targets

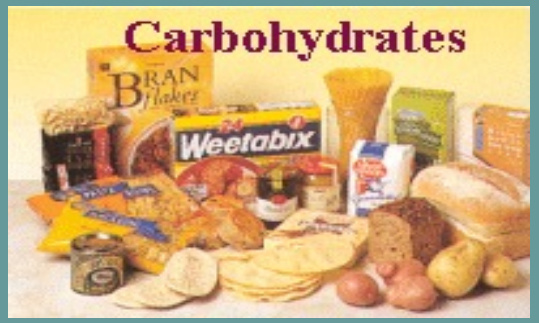
Disease prevention

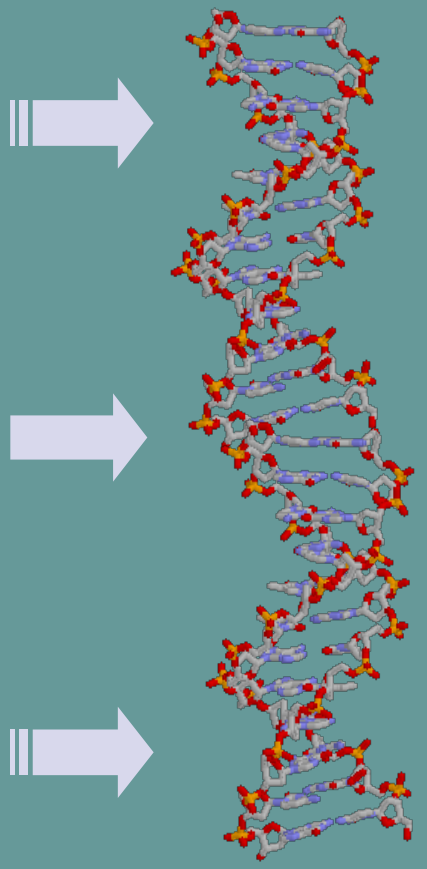
Moleküler Beslenme









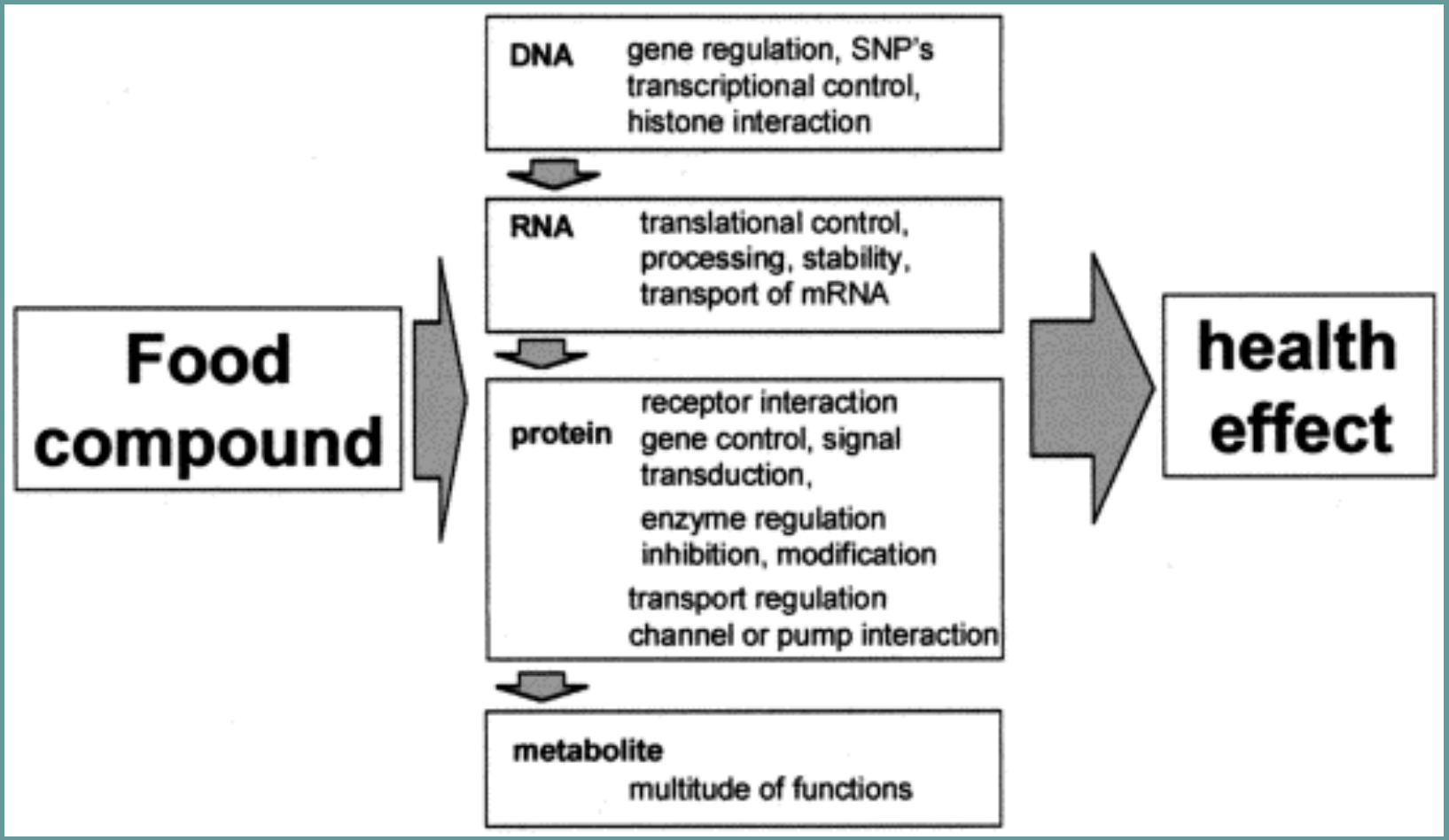


Transkripsiyon faktörleri ve yolaklar

Nutrient	Compound	Transcription factor
Macronutrients		
Fats	Fatty acids Cholesterol	PPARs, SREBPs, LXR, HNF4, ChREBP SREBPs, LXRs, FXR
Carbohydrates	Glucose	USFs, SREBPs, ChREBP
Proteins	Amino acids	C/EBPs
Micronutrients		
Vitamins	Vitamin A Vitamin D Vitamin E	RAR, RXR VDR PXR
Minerals	Calcium Iron Zinc	Calcineurin/NF-ATs IRP1, IRP2 MTF1
Other food components		
	Flavonoids Xenobiotics	ER, NFκB, AP1 CAR, PXR



Nutrisyonel Genomik



van Ommen B. (2004) *Nutrition* 20:4-8.

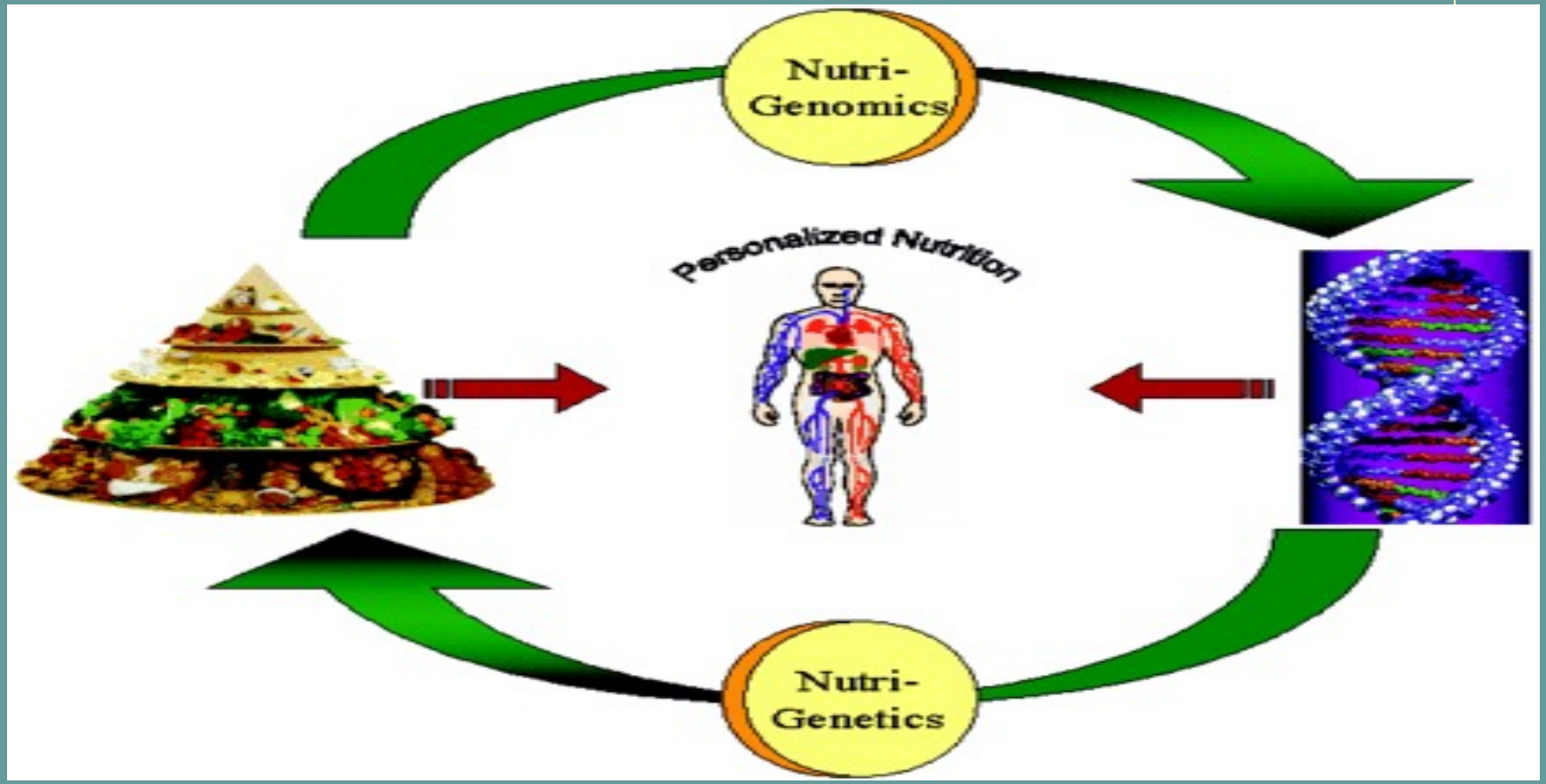
Nutrigenomik ve Nutrigenetik



- “Nutrigenomik ... beslenme genom etkilerini incelemek için çalışır
- Diyet ile ilişkili hastalıkların riskini etkileyen genleri belirlemek ve bu genetik yatkınlığı altında yatan mekanizmaları anlamayı amaçlamaktadır.“
- ” Muller M & Kersten S. (2003) *Nature Reviews Genetics* 4:315-322.

- “Nutrigenetik diyet ve hastalık arasındaki etkileşimin veya besin gereksinimleri üzerine genetik varyasyonun etkisini inceler.
- Genetik belli bir hastalığa yakalanma bireyin riskini belirlemede çok önemli bir role sahiptir. "
- Muller M & Kersten S. (2003) *Nature Reviews Genetics* 4:315-322.

Nutrigenomik ve Nutrigenetik



Mutch D, et al. (2005) *FASEB Journal* 19:1602-1616.

Personalized nutrition from a ×
Personalized nutrition from a ×
www.ncbi.nlm.nih.gov/pmc/articles/PMC2474937/

Genes Nutr. 2007 October; 2(1): 3–4. PMCID: PMC2474937
Published online 2007 September 19. doi: 10.1007/s12263-007-0018-5

Personalized nutrition from a health perspective: luxury or necessity?

Ben van Ommen

Author information ▶ Article notes ▶ Copyright and License information ▶

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Scientific progress has shown the involvement of diet in a large number of diseases and disorders (e.g. colon cancer, cardiovascular disorders, diabetes mellitus type 2, a number of inflammation related health problems, etc.). This triggered the introduction of functional foods, dietary components with "added health value". So far, only a few successful products were launched (cholesterol lowering stannols, probiotics, a number of specific fatty acids), and most of these functional foods had great difficulty to obtain scientific proof of efficacy. Why does nutritional science have such a hard job in providing evidence for health

Related citations in PubMed

Health care is an individual necessity and a national luxury: applying multilevel deci [J Health Econ. 2000]

Patients, evidence and genes: an exploration of GPs' perspectives on gene-based perso [Fam Pract. 2008]

Strong bones in later life: luxury or necessity? A patient's perspective [Bull World Health Organ. 1999]

Formalized new-faculty orientation programs: necessity or luxury? [Nurse Educ. 2008]

Genomic and personalized medicine: foundations and applications. [Transl Res. 2009]

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Cited by other articles in PMC

Intersection of Inflammation and Herbal Medicine in the Treatment [Current Rheumatology Reports. 2012]

Nutrigenetics, Nutrigenomics, and Selenium

Genes Nutr

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National Institutes of Health

Display Settings: Abstract

Nutrition. 2004 Jan;20(1):4-8.

Nutrigenomics: exploiting systems biology in the nutrition and health arenas.

van Ommen B.

Author information

PMID: 14698007 [PubMed - indexed for MEDLINE]

Publication Types, MeSH Terms, Substances

J Carcinog. 2004 May 12;3(1):8.

Time- and dose-dependent effects of curcumin on gene expression in human colon cance cells.

Van Erk MJ, Teuling E, Staal YC, Huybers S, Van Bladeren PJ, Aarts JM, Van Ommen B.

Author information

Abstract

BACKGROUND: Curcumin is a spice and a coloring food compound with a promising role in colon cancer prevention. Curcumin protects against development of colon tumors in rats treated with a colon carcinogen, in colon cancer cells curcumin can inhibit cell proliferation and induce apoptosis, it is an anti-oxidant and it can act as an anti-inflammatory agent. The aim of this study was to elucidate mechanisms and effect of curcumin in colon cancer cells using gene expression profiling.

METHODS: Gene expression changes in response to curcumin exposure were studied in two human colon cancer cel lines, using cDNA microarrays with four thousand human genes. HT29 cells were exposed to two different concentrations of curcumin and gene expression changes were followed in time (3, 6, 12, 24 and 48 hours). Gene expression changes after short-term exposure (3 or 6 hours) to curcumin were also studied in a second cell type, Cac 2 cells.

J Nutr. 2011 May;141(5):863-9. doi: 10.3945/jn.110.133751. Epub 2011 Mar 16.

A dietary mixture containing fish oil, resveratrol, lycopene, catechins, and vitamins E and C reduces atherosclerosis in transgenic mice.

Verschuren L, Wielinga PY, van Duyvenvoorde W, Tijani S, Toet K, van Ommen B, Kooistra T, Kleemann R.

Author information

Abstract

Chronic inflammation and proatherogenic lipids are important risk factors of cardiovascular disease (CVD). Specific dietary constituents such as polyphenols and fish oils may improve cardiovascular risk factors and may have a beneficial effect on disease outcomes. We hypothesized that the intake of an antiinflammatory dietary mixture (AIDM) containing resveratrol, lycopene, catechin, vitamins E and C, and fish oil would reduce inflammatory risk factors, proatherogenic lipids, and endpoint atherosclerosis. AIDM was evaluated in an inflammation model, male human C-reactive protein (CRP) transgenic mice, and an atherosclerosis model, female ApoE*3Leiden transgenic mice. Two groups of male human-CRP transgenic mice were fed AIDM [0.567% (wt:wt) powder and 0.933% (wt:wt oil)] or placebo for 6 wk. The effects of AIDM on basal and IL-1β-stimulated CRP expression were investigated. AIDM reduced cytokine-induced human CRP and fibrinogen expression in human-CRP transgenic mice. In the atherosclerosis study, 2 groups of female ApoE*3Leiden transgenic mice were fed an atherogenic diet supplemented with AIDM [0.567% (wt:wt) powder and 0.933% (wt:wt oil)] or placebo for 16 wk. AIDM strongly reduced plasma cholesterol, TG, and serum amyloid A concentrations compared with placebo. Importantly, long-term treatment of ApoE*3Leiden mice with AIDM markedly reduced the development of atherosclerosis by 96% compared with placebo. The effect on atherosclerosis was paralleled by a reduced expression of the vascular inflammation markers and adhesion molecules inter-cellular adhesion molecule-1 and E-selectin. Dietary supplementation of AIDM improves lipid and inflammatory risk factors of CVD and strongly reduces atherosclerotic lesion development in female transgenic mice

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City: _____ State: _____ Zip: _____

Nutritional Genetic Profile Requested

Item	Number ordered	Cost (per item)	Total
Nutritional Genetic Panel		$445.00	
Nutritional Genetic Collection Kit (Additional $410 due with samples)		$35.00	
International Shipping		$50.00	
Amount Due			

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For immediate consultation Call 800-TEST-DNA (800-837-8362)
Hours 7:00 AM to 6:00 PM PST, 10:00 AM to 9:00 PM EST, fax 425-825-1870,
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Consumers warned that time is not yet ripe for nutrition profiling

Erika Check

One day, information about your genome may well help you decide what breakfast cereal to eat. But that day's a long way off, the second International Nutrigenomics Conference in Amsterdam was told last week. In the meantime, researchers at the meeting heard, the emerging field badly needs a regulatory framework that will stop its first customers from being scared off.

Nutrigenomics researchers aim to learn how nutrients interact with genes to lead to health or disease. But people eat wildly different levels of nutrients over their lifetimes, and teasing apart the precise interactions is notoriously difficult.

The researchers who gathered in Amsterdam on 6–7 November were in optimistic mood, however. Their science is progressing quickly, and food industry executives have expressed interest in the idea of using genetic information to customize their products.

In January, the US National Institutes of Health used a 5-year, $6.5-million grant to create a National Center of Excellence for Nutritional Genomics at the University of California, Davis, and the Children's Hospital Oakland Research Institute (CHORI) in Oakland. In July, the European Commission set up the European NutriGenomics Organisation to coordinate work. Now the Netherlands looks set to embark on a $20-million nutrigenomics project, jointly funded by the government and the food industry.

But some researchers warn that the field is in danger of developing too quickly. They want experts to back off from the sometimes-extravagant claims for the field's potential, and instead to sit down and patiently work out a scientific vision and ethical framework for the discipline.

"Our aim is to bring the field a little bit back down to Earth, because people tend to start with a lot of science fiction," says Michael Muller, a genomicist at Wageningen University in the Netherlands who helped to organize the meeting.

The main fruits of this field are still years away, researchers say. So far, most of the studies on profiling gene expression — measuring genome-wide responses to nutrients — have been done in mice. And much more work is needed on the basic mechanisms by which nutrients turn genes on or off. But that hasn't stopped a handful of companies from selling nutritional profiles directly to consumers over the Internet.



Looks good, tastes good, and one day individuals may know exactly how much good it does them.

The companies test a tissue sample — such as a cheek swab — from a "patient". The patient can choose which genetic profile he or she wants to learn about, for example skin ageing or susceptibility to osteoporosis. The company then gives the patient a "personalized profile" based on its tests for single nucleotide polymorphisms (SNPs): genetic variants that have been linked to disease. For instance, one company, GeneLink of Margate, New Jersey, tells people what vitamins they should take, based on SNPs involved in cellular responses to certain toxins. GeneLink declined to comment on its products.

But many scientists argue that it's far too early for most of these tests to be useful. "The idea of marketing any individual genetic test at this point assumes there is information to justify the use of that test, and we really don't have evidence that any single genetic marker carries enough information to guide dietary treatments," says Ronald Krauss, director of atherosclerosis research at CHORI.

The direct-to-consumer tests also raise ethical issues that affect the whole field. For instance, some companies sell the results of their genetic profiles to other firms, which use the information for research on genes and disease. Although consumers must give their consent, they may not necessarily understand what they're agreeing to, says ethicist David Castle of the University of Guelph. Castle is collaborating with the University of Toronto Joint Center for Bioethics in soliciting comments on a joint working paper on ethics and nutrigenomics.

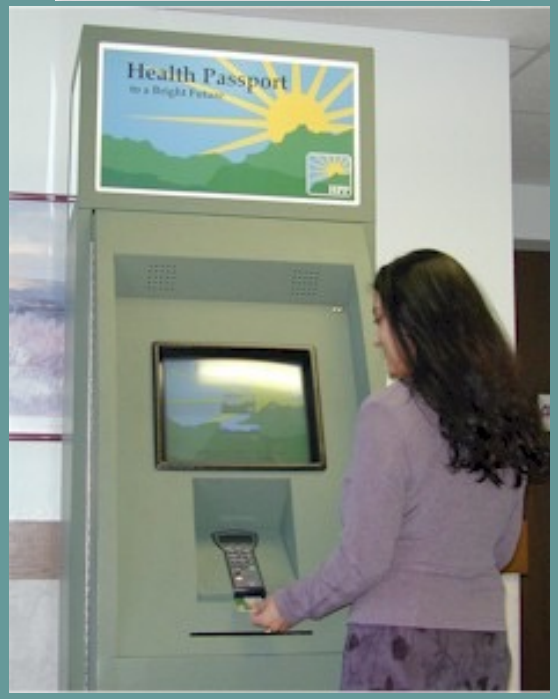
At the nutrigenomics meeting, Castle argued that even though the field is very young, scientists must begin talking to the public about such issues.

"This technology could end up affecting something that every person does every day, which is eat," Castle says. "It's not a situation where you want to roll out the science and the products and then go back and ask people how they feel about it." ■

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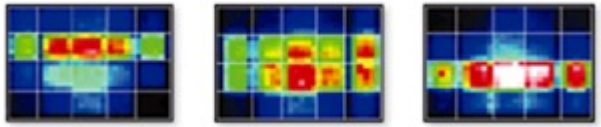
Gen pasoportunuz ve beslenme





Genotip
Fonksiyonel fenotip

AA AB BB





Optimal Nutrition



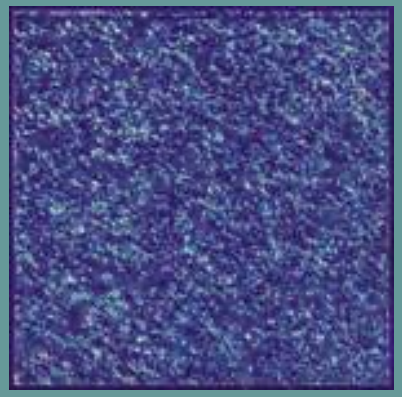
Lifestyle

Improvement
Maintenance
of Health

"Eat right for your genotype??"

Nutrigenomik araştırmalar : The GeneChip® System



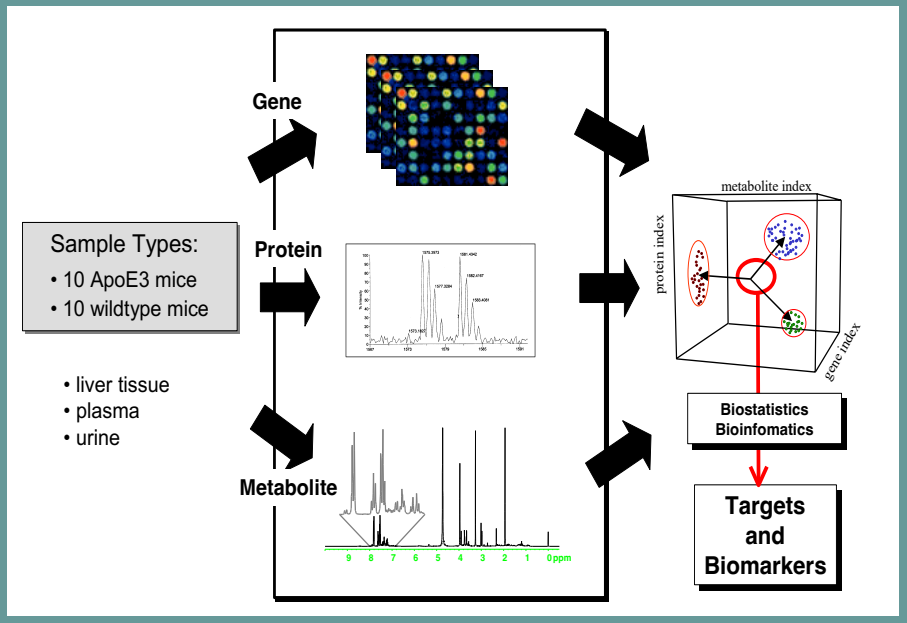


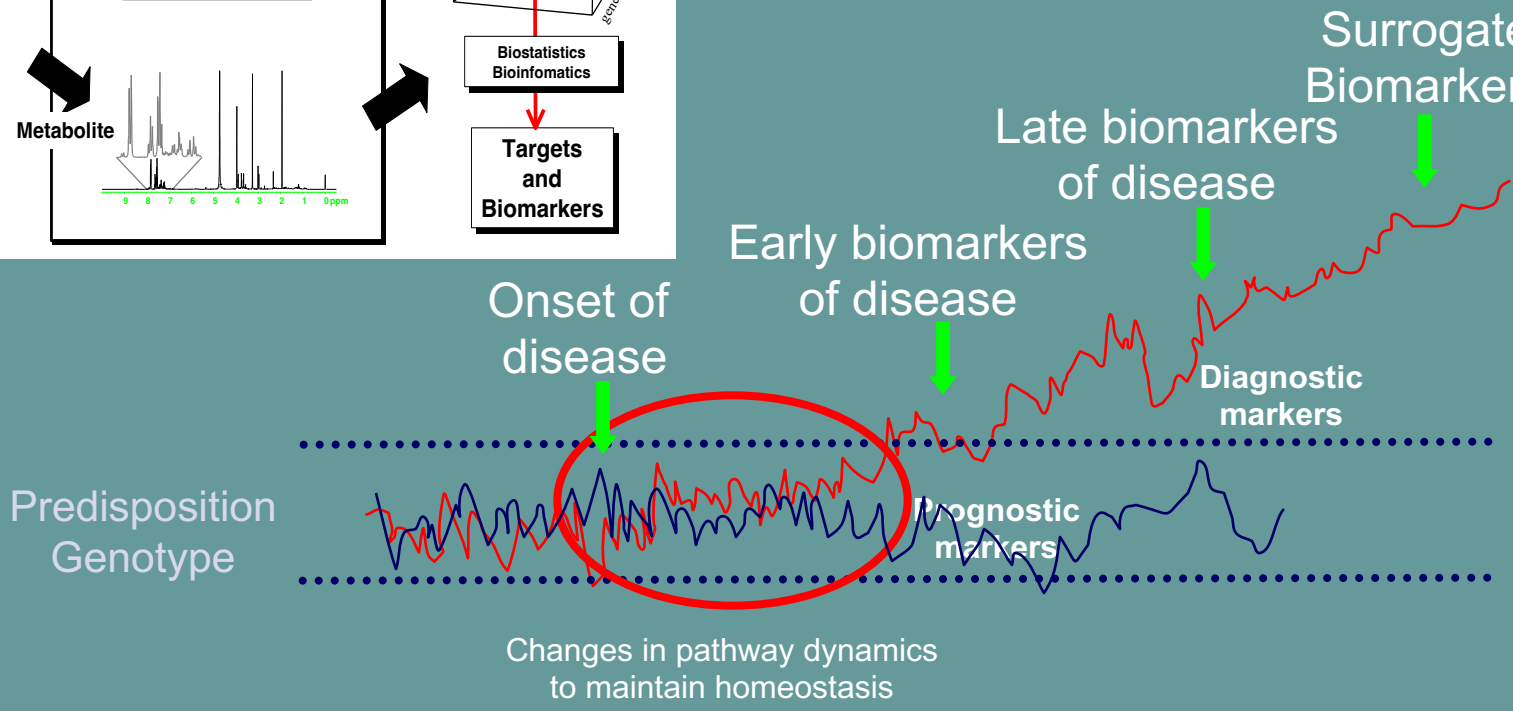






Nutrisyonel Sistem Biyolojisi





TODAY

Wednesday FOOD | with Phil Lempert

New DNA kits to help you manage your health?

A $99 test, available in some supermarkets, may help consumers manage risks associated with heart health, bone health, insulin resistance and more

Genler – Yaşam biçimi – Kaloriler



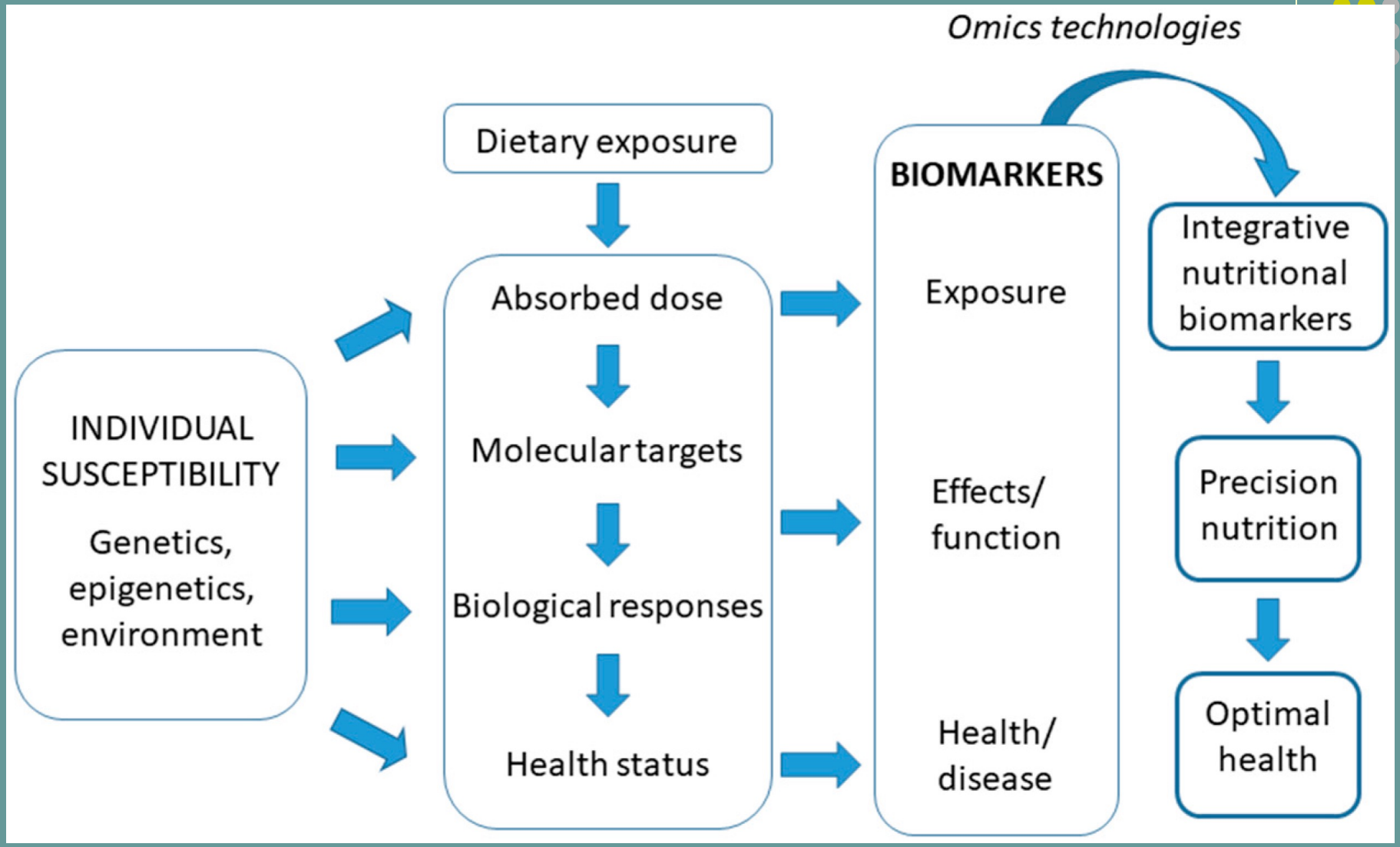








- Sağlık/hastalık durumu ile ilişkisi de dahil olmak üzere, organizma üzerindeki alım ve etkilerin göstergesi olan bütünleştirici bir özelliğe sahip yeni beslenme biyobelirteçleri türlerinin geliştirilmesine büyük ilgi vardır ve omik teknolojiler ilgili bir rol oynayabilir.


Omics technologies
Dietary exposure
BIOMARKERS
Integrative nutritional biomarkers
Absorbed dose
Exposure
INDIVIDUAL SUSCEPTIBILITY
Genetics, epigenetics, environment
Molecular targets
Effects/ function
Precision nutrition
Biological responses
Optimal health
Health status
Health/ disease

- Sağlığı iyileştirmek ve hastalıkları önlemek için her bir kişinin diyetini genomuna göre uyarlayabilirler....

