Εφαρμογές στη Βιοϊατρική Μηχανική

ΕΤΥ-494

Εαρινό εξάμηνο 2018

ΝΙΚΟΣ ΧΡΟΝΗΣ

chronis@materials.uoc.gr

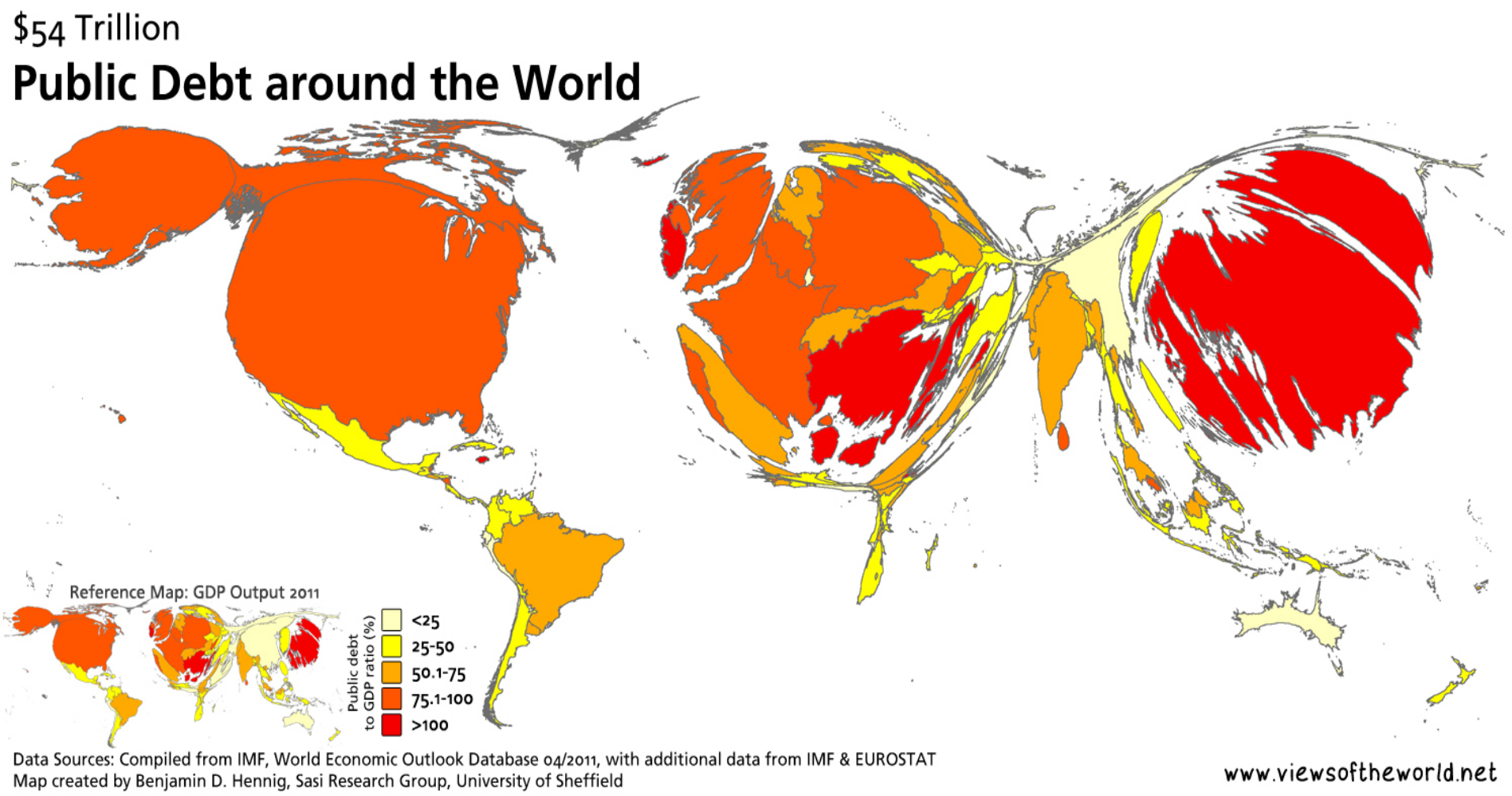
Έχετε να Προτείνετε

Εφαρμογές/Παραδείγματα της

‘***Βιοϊατρικής Μηχανικής***’ ;

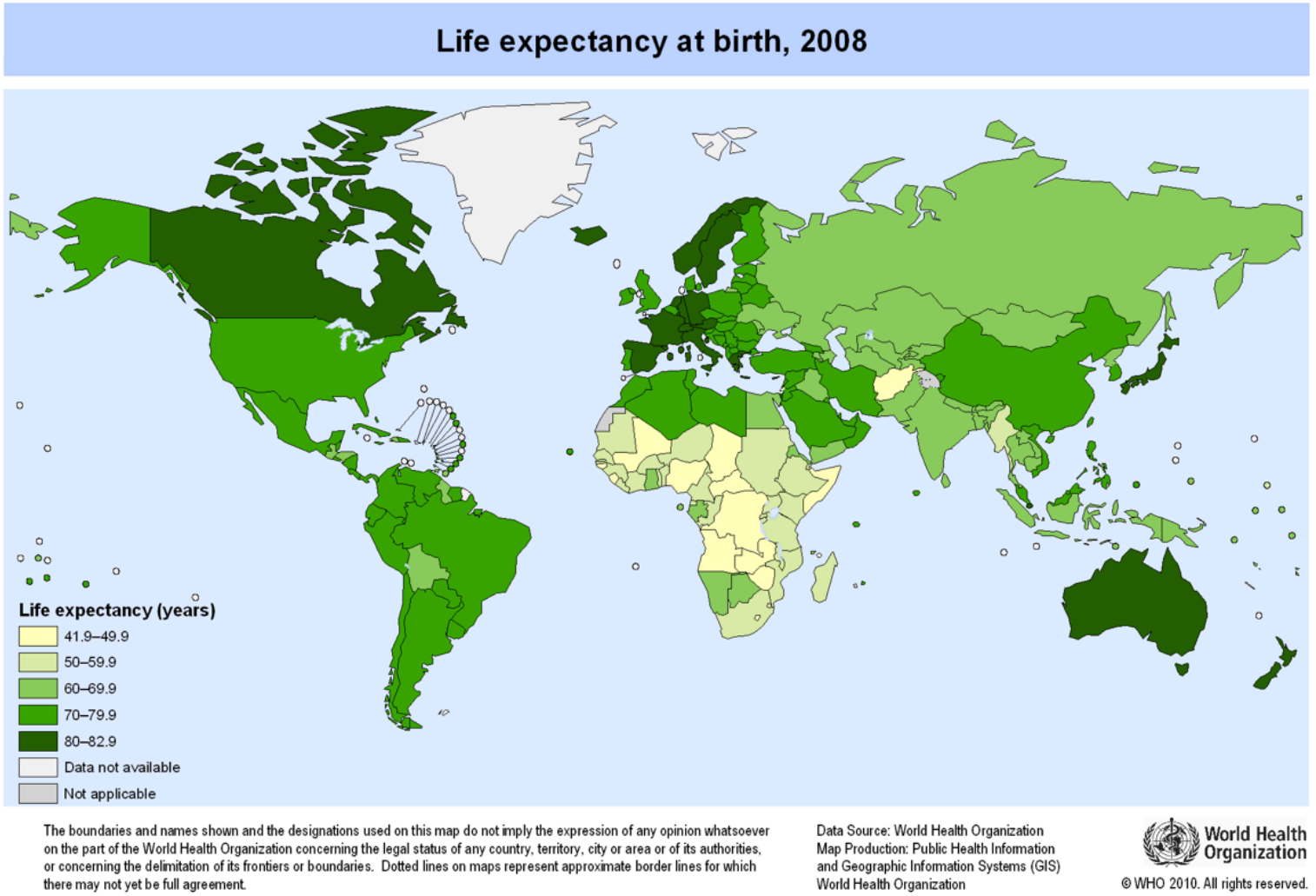
Πως θα μεταφράζαμε το όρο ‘***Βιοϊατρική Μηχανική***’ στα Αγγλικά ;

Δημόσιο Χρέος (Public Debt)



http://www.viewsoftheworld.net/?p=1766

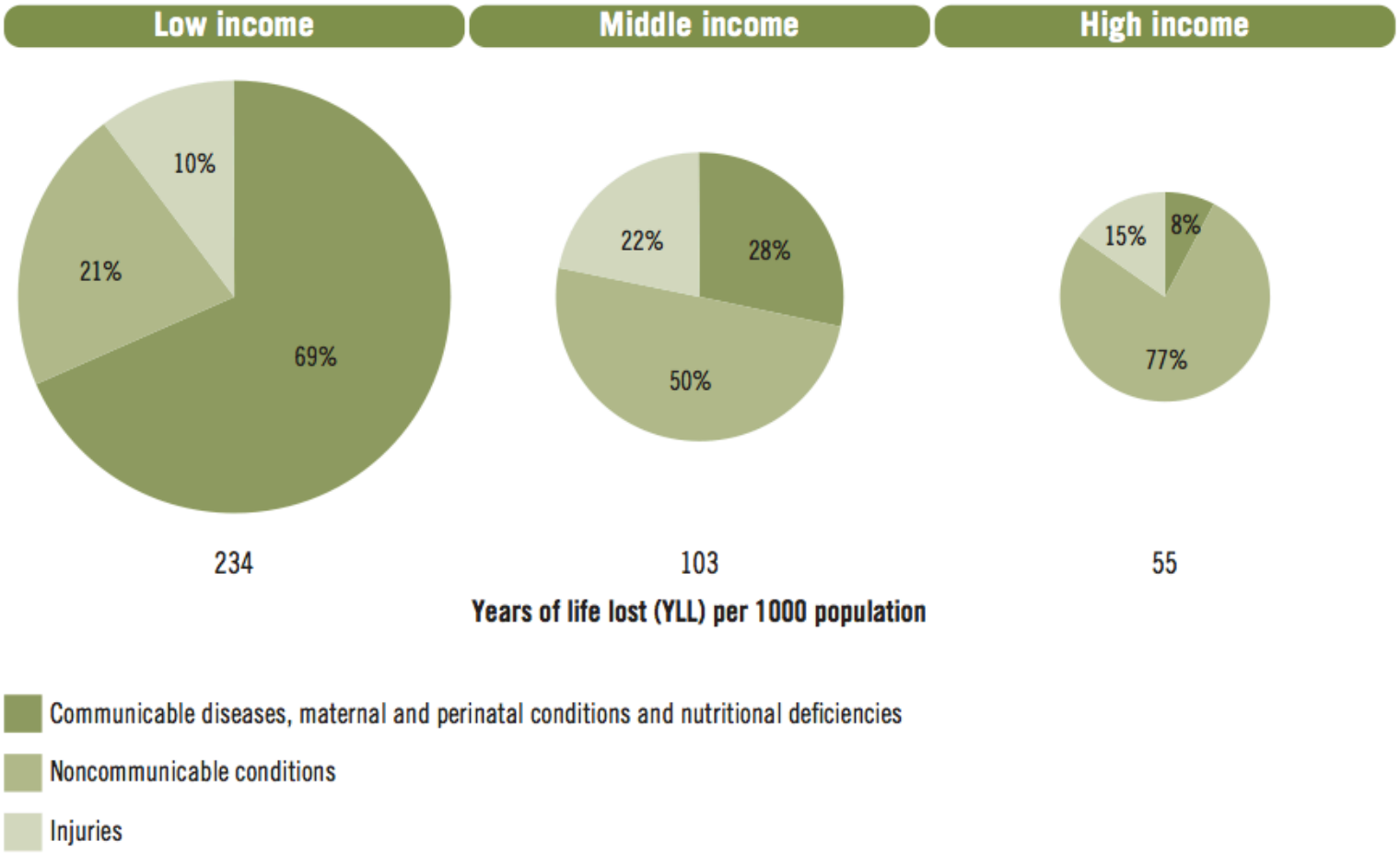
Global Health



Life Expectancy: Προσδοκιμο Ζωης

http://earlywarn.blogspot.gr/2011/04/life-expectancy-around-world.html

High Income vs Low Income Countries



Communicable Diseases: Ebola, Enterovirus D68, Flu, Hantavirus, HIV/AIDS, Measles, MRSA, Pertussis, Rabies, Sexually Transmitted Disease, Tuberculosis, West Nile Virus

http://earlywarn.blogspot.gr/2011/04/life-expectancy-around-world.html

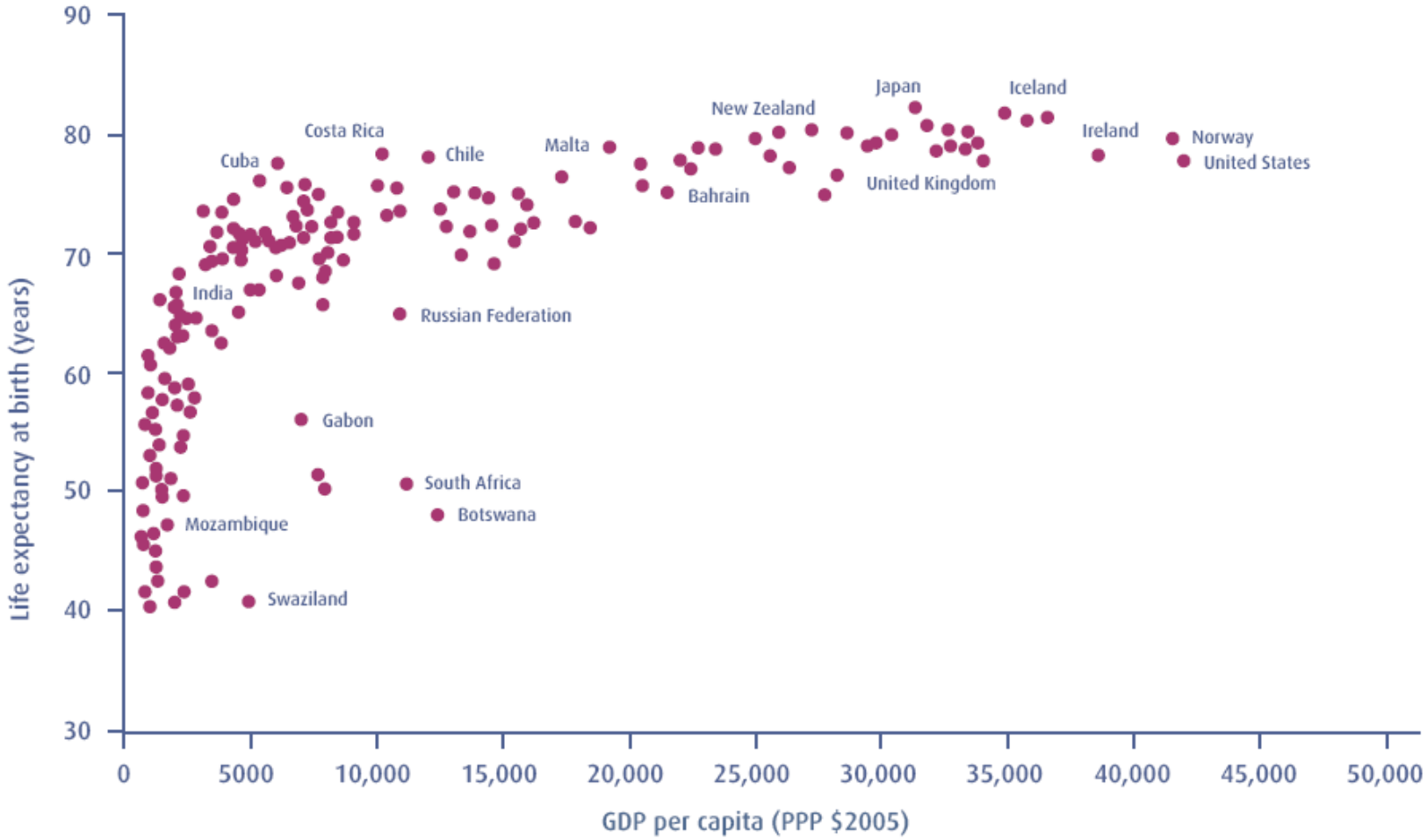
Και λιγο ιστορια...

75 έως 100 εκατομμύρια νεκρούς στην Ευρώπη και στην Ασία

Yersinia pestis bacterium

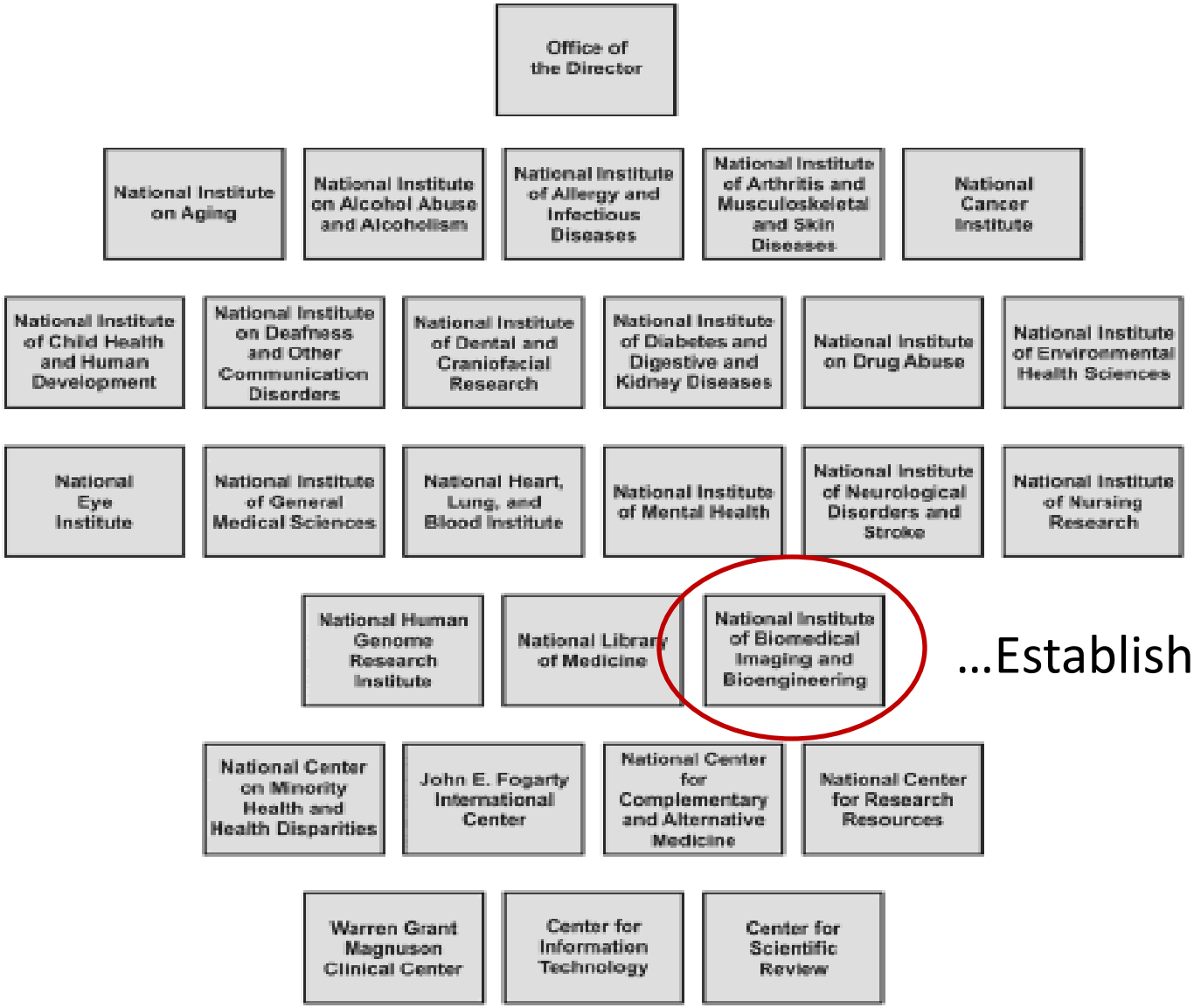
Βάκιλος του Γερσίν

Figure 8 **Life expectancy at birth vs average annual income**[16]



http://www.oxfamblogs.org/fp2p/wp-content/uploads/life-expectancy-v-gdp.png

Εθνικο Ινστιτούτο Υγειας των ΗΠΑ (National Institute of Health-NIH)



...Established in 2002

Bio-Engineering Education

Biomedical Engineering / Bioengineering

Ranked in 2014, part of Best Engineering Schools

Click here for the GRE study guide

Biomedical engineering and bioengineering involve finding solutions to medical problems, often using technology, electronics or mechanics. These are the top engineering schools for graduate biomedical / bioengineering degrees.

▸ **For full rankings, GRE scores and student debt data, sign up for U.S. News Engineering School Compass!**

Rankings			Overall Engineering School Program Data		
Rank	School name	Score	Tuition	Total graduate engineering enrollment	Average GRE quantitative score (master's and Ph.D. students) (new test)
#1	Johns Hopkins University (Whiting) Baltimore, MD	4.6	$45,470 per year (full-time)	3,296	
#2	Georgia Institute of Technology Atlanta, GA	4.4	$11,324 per year (in-state, full-time); $27,330 per year (out-of-state, full-time)	4,576	
#3	Massachusetts Institute of Technology Cambridge, MA	4.3	$43,210 per year (full-time)	3,174	
#3	University of California—San Diego (Jacobs) La Jolla, CA	4.3	$11,220 per year (in-state, full-time); $26,322 per year (out-of-state, full-time)	1,715	
#5	Duke University (Pratt) Durham, NC	4.2	$47,100 per year (full-time)	981	
#5	Stanford University	4.2	$45,480 per year (full-time)	3,517	

Η Ελλάδα χρειαζεται εμβιο-μηχανικούς?

	USA	GREECE
Money Spent Per year (through NIH)	~30 billlion dollars	?
US population	320 million people	11 million
Per person	~$95	
As% GDP	0.2%	
Number of Doctors	900,000 (2.8 per 1000)	68,000 (6.2 per 1000)
Number of Bio-Engineers	30,000	0

Εφαρμογές της

‘***Βιοϊατρικής Μηχανικής***’

World Leaders Getting In Fights

https://www.youtube.com/watch?v=U3DHKni1mu8

Men's 200m - London 2012 Paralympic Games

https://www.youtube.com/watch?v=A9Wlp1sTnoY

THE FOLLOWING PREVIEW HAS BEEN APPROVED FOR

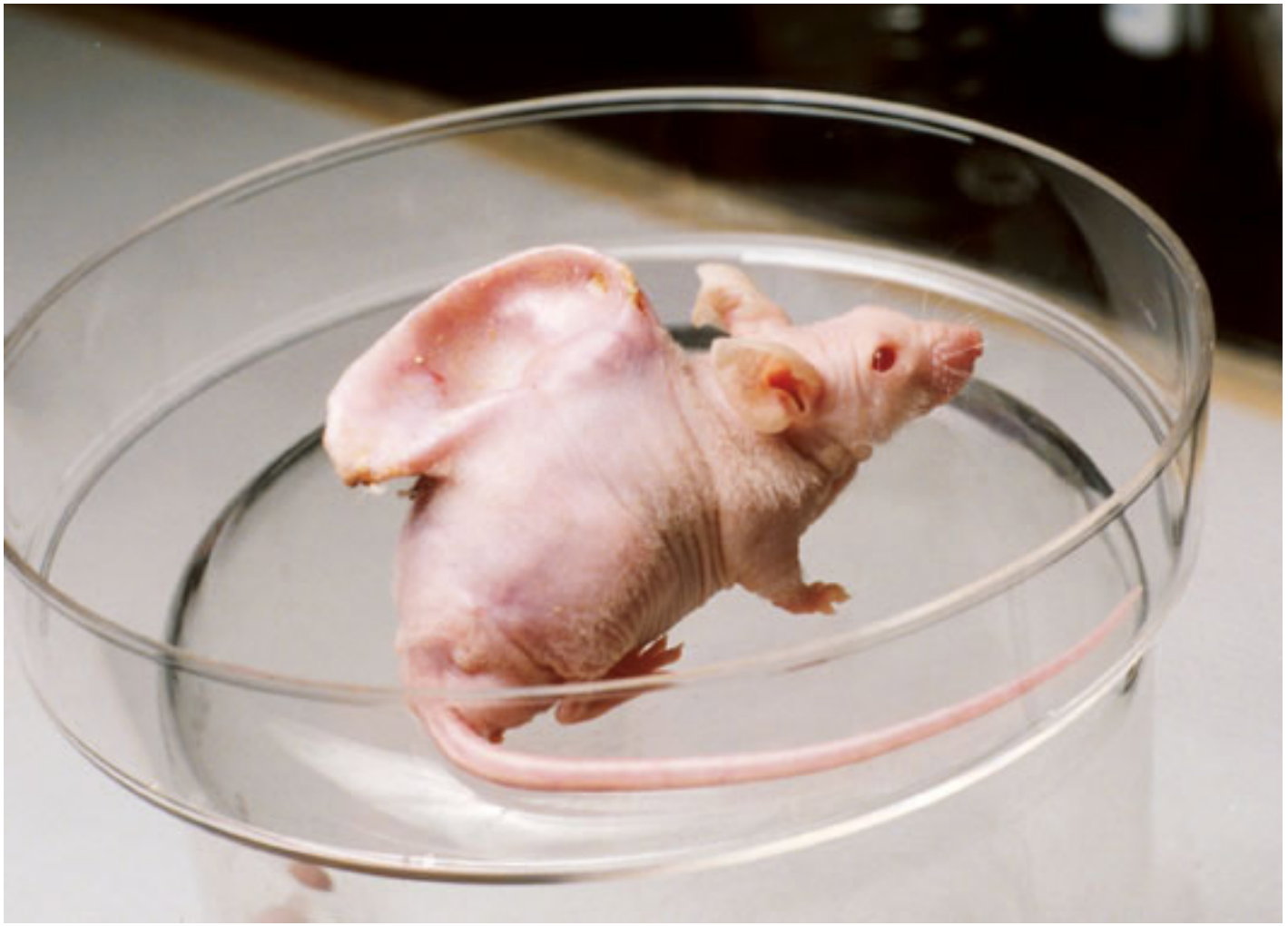
APPROPRIATE AUDIENCES

BY THE MOTION PICTURE ASSOCIATION OF AMERICA, INC.

www.filmratings.com

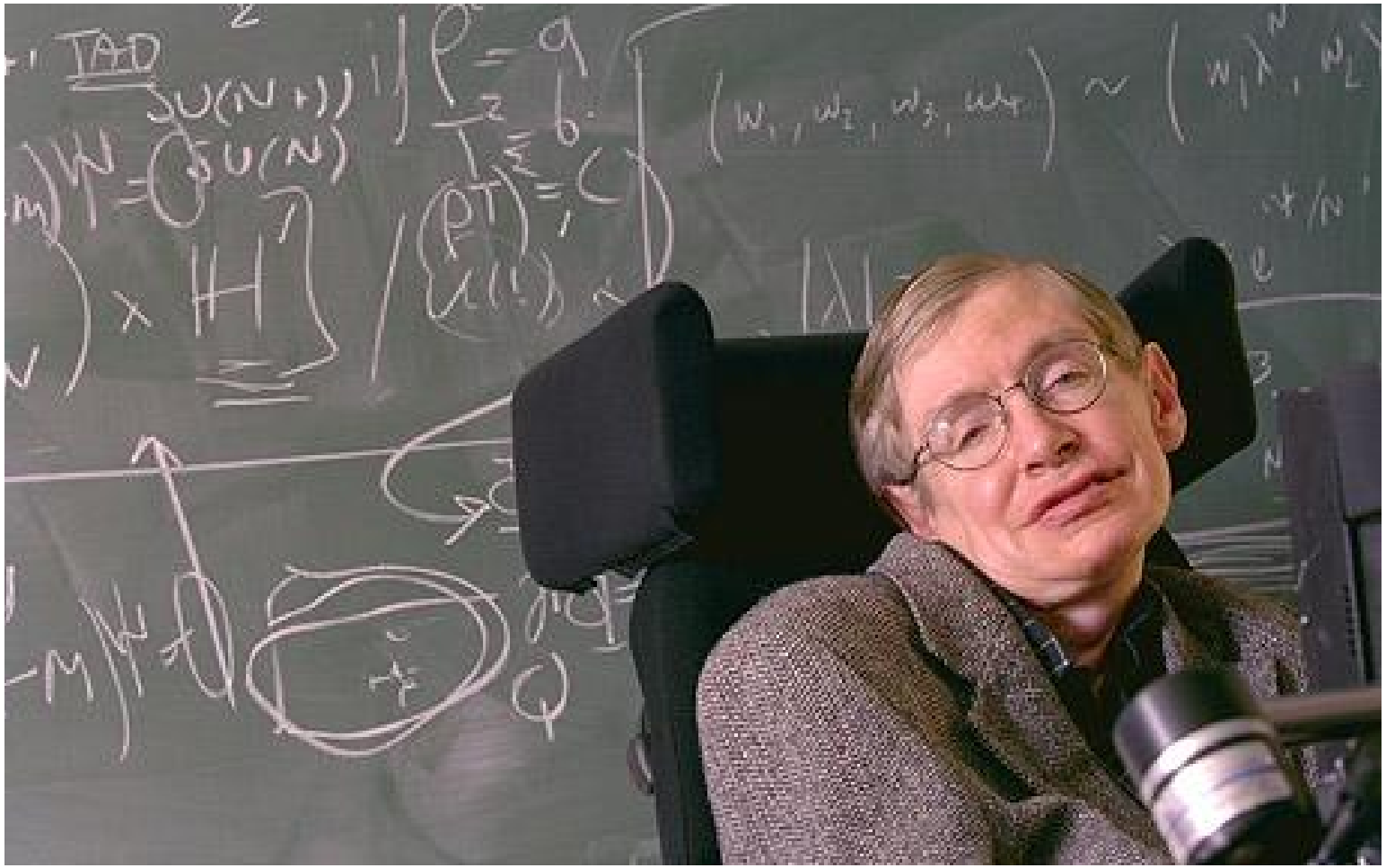
www.mpaa.org

http://www.bbc.com/news/science-environment-23576143



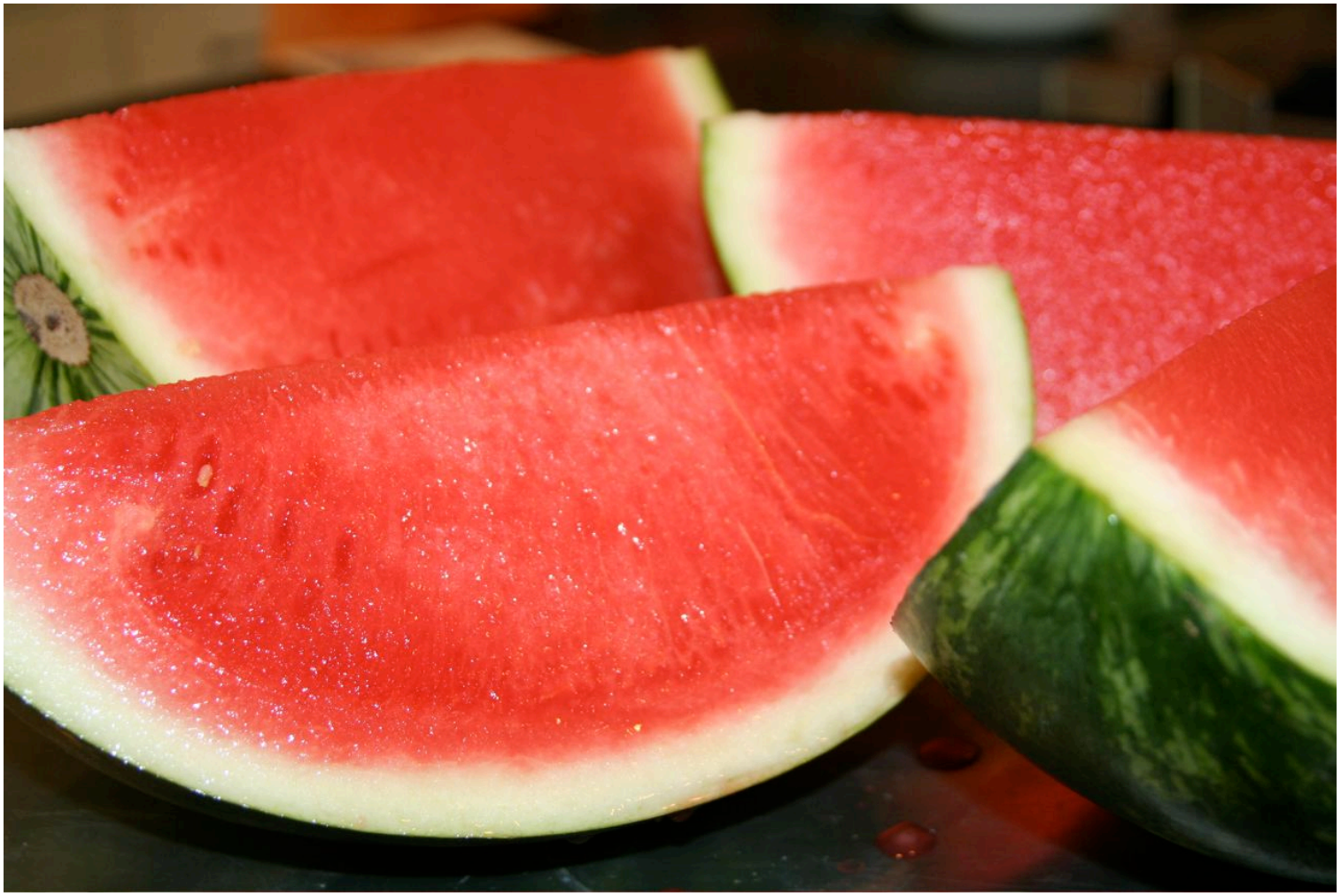
http://www.pbs.org/saf/1107/features/body.htm

Stephen Hawking



Difficulty in Walking?

https://www.youtube.com/watch?v=I_dCwn-CU9g



http://www.vox.com/2014/10/15/6982053/selective-breeding-farming-evolution-corn-watermelon-peaches

NATURAL "WATERMELON" ~3000 B.C.

OPEN WITH A HAMMER OR SHARP OBJECT

EXTREMELY BITTER TASTE
(SOME VARIETIES ARE BITTER-SWEET)

CAUSES INFLAMMATION

50 MM

18 SEEDS, VERY RICH IN FAT
THEY TASTE NUTTY AND EXTREMELY BITTER

6 KNOWN VARIETIES

FOUND IN NAMIBIA & BOTSWANA

80.0% WATER

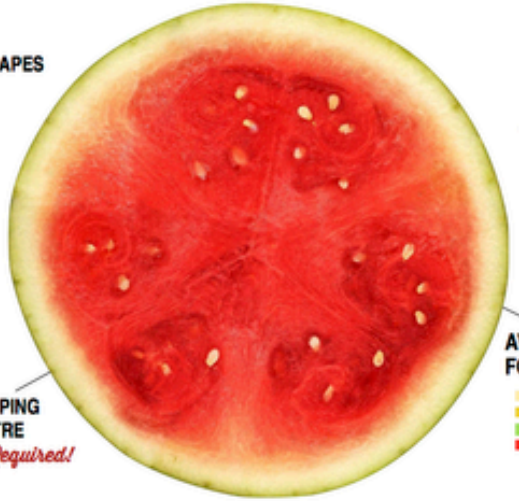
1.9% SUGARS

18.1% OTHER
MOSTLY STARCH AND FAT

ARTIFICIAL WATERMELON, 2014

DIFFERENT SHAPES AVAILABLE:

SPHERICAL
SPHEROID
MOULDED INTO ANY SHAPE



Deliciously sweet & so juicy that it sometimes explodes when ripe

Reduces inflammation!

Seedless!

OPEN BY DROPPING FROM ONE METRE
No Hammer Required!

AVAILABLE IN FOUR COLOURS:

- CREAM
- YELLOW
- LIME GREEN
- RED

~1200 VARIETIES
200-Fold Increase

Annual Production: 95 Million Tonnes

Grown in 15 Countries
Most are grown in China

91.5% WATER
14% Juicier

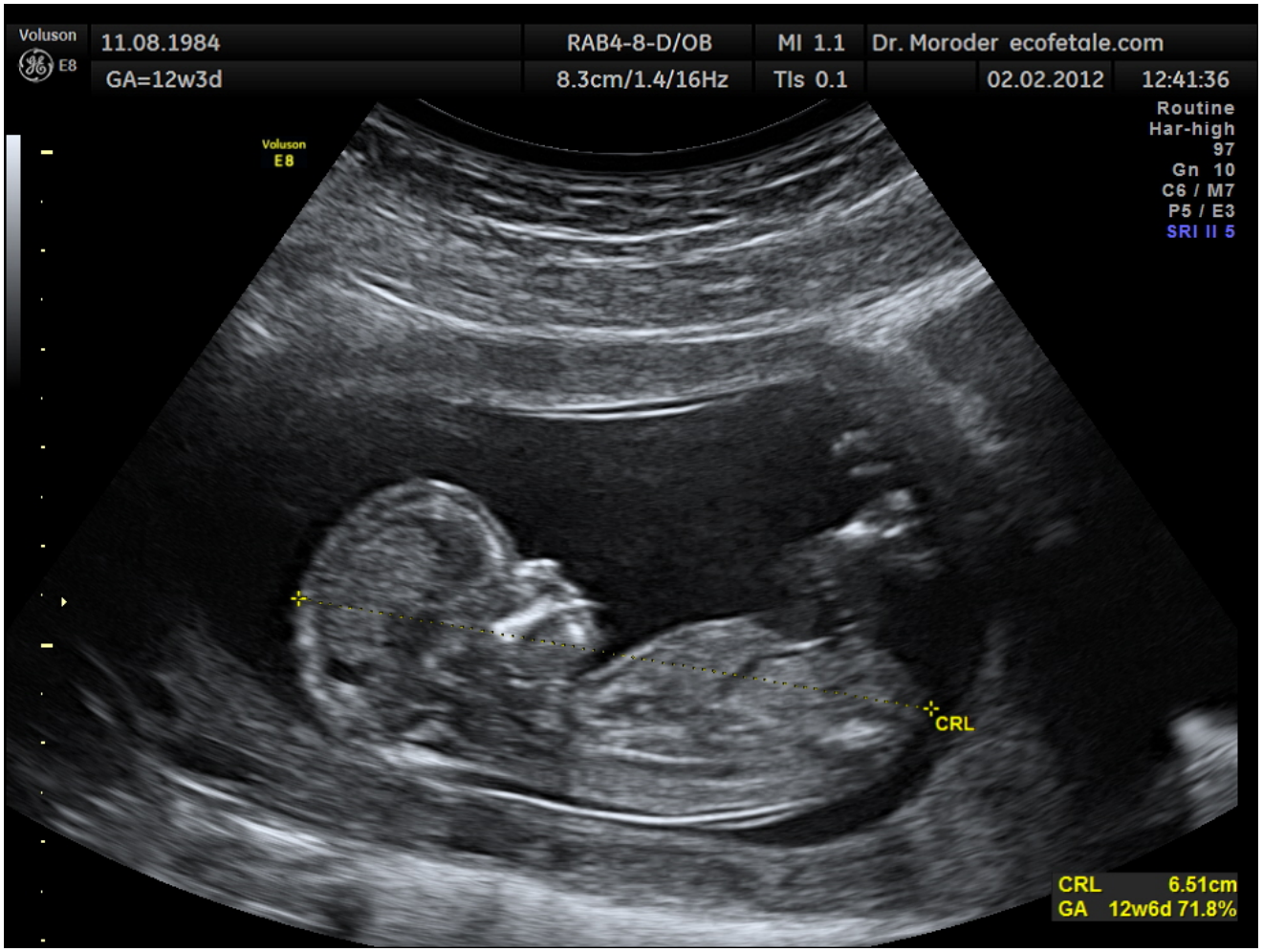
6.2% SUGARS
3.3x Sweeter

2.3% OTHER
Virtually Fat-Free and Starch-Free
35x more Vitamin C

Image shows three sets of tomatoes. The ordinary control tomatoes (extreme left) soften and shrivel up, while texture of gene-silenced tomatoes remains intact for up to 45 days.

Photo credit: Asis Datta, Subhra Chakraborty, National Institute of Plant Genome Research, New Delhi

Αγόρι ή Κορίτσι?



Food Worth Dying For…

Malawian women

68,000 deaths a year from HIV/AIDS

Image taken from:
http://amivitale.photoshelter.com/image/I0000RAqTjpac9M8

Bio-Engineering

BioFluid Mechanics & BioHeat Transfer

Device Bio-Engineering

Medical Physics

Genetic Engineering

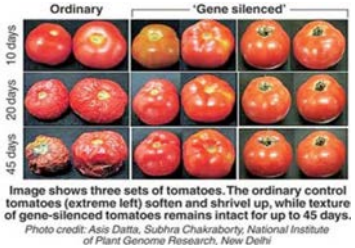


Image shows three sets of tomatoes. The ordinary control tomatoes (extreme left) soften and shrivel up, while texture of gene-silenced tomatoes remains intact for up to 45 days.
Photo credit: Asis Datta, Subhra Chakraborty, National Institute of Plant Genome Research, New Delhi

Tissue Engineering

Biomechanics

1) Εργασια: 30 % του τελικου βαθμου
('μη υποχρεωτικη')
2) Συμμετοχη/Παρουσιαση : 10% του τελικου βαθμου
3) Τελικη εξεταση : 60% του βαθμου

*** Αν καποιος/καποια ΔΕΝ κανει εργασια και ΔΕΝ συμμετεχει στο μαθημα, ο μεγιστος βαθμος που μπορει να παρει ειναι 6.**

Οι βαθμοί στο project και η συμμετοχή/παρουσίαση μπορούν να κρατηθούν ΚΑΙ για την εξεταστικη του Σεπτεβριου αλλα ΟΧΙ για τα επομενα ετη

Η εργασια (3 μοναδες): Βιβλιογραφικη ανασκοπηση

The Evolution of Dental Materials for Hybrid Prosthesis

Jorge Gonzalez*

3302 Gaston Ave, Dallas TX, 75246, Center for Maxillofacial Prosthetic Clinic, Baylor College of Dentistry, Room #169, USA

Abstract: Since the immemorial, the replacement of missing teeth has been a medical and cosmetic necessity for human kind. Nowadays, middle-aged population groups have experienced improved oral health, as compared to previous generations, and the percentage of edentulous adults can be expected to further decline. However, with the continued increase in the number of older adult population, it is anticipated that the need for some form of full-mouth restoration might increase from 53.8 million in 1991 to 61 million in 2020 [1]. Denture prosthetics has undergone many development stages since the first dentures were fabricated. The introduction of computer-aided design/computer aided manufacturing (CAD/CAM) has resulted in a more accurate manufacturing of prosthetic frameworks, greater accuracy of dental restorations, and in particular, implant supported prosthesis.

Keywords: Cantilevers, complete edentulous, computer-assisted design/computer-assisted machining (CAD/CAM), dental implants, hybrid prosthesis, intraoral scanner, zirconia.

HISTORIC PERSPECTIVES

Since the immemorial, the replacement of missing teeth has been a medical and cosmetic necessity for human kind. Denture prosthetics has undergone many development stages since the first still preserved dentures were fabricated. While 3,500 years ago, the ancient Egyptians carved false teeth out of mulberry wood and tied them to the adjacent teeth with gold wire, the Etruscans arrived at considerable skill, producing construction made of gold and bovine teeth, which were already guided by principles used in denture prosthetics today [2].

Dental technology remained virtually undeveloped until the 18th century. Candidate materials for artificial teeth during the 18th century were (1) human teeth, (2) animal teeth carved to the size and shape of human teeth, (3) ivory, and finally (4) "mineral" or porcelain teeth. Other than for costly human teeth that were scarce, the selection of artificial tooth materials was based on their mechanical versatility and biologic stability. Animal teeth were unstable toward the "corrosive agents" in saliva, and elephant ivory and bone contained pores that easily stained. Hippopotamus ivory appears which refused to stay in place due to both the heavy weight and the poor fit. In order to overcome this problem, upper dentures were fashioned onto the lower dentures by means of springs or hinges. This technique would ensure that the upper denture would always be pushed up against the roof of the mouth [6].

The first porcelain teeth were developed as early as in 1709 after the introduction of porcelain manufacturing secrets by Father d'Entrecolle, a Jesuit priest who had spent many years in China, but their massive production was not undertaken until 1837 [2]. This end the practice of transplanting freshly extracted human teeth and supplanted the use of animal products [5].

In 1774, Alexis Duchateau and Nicholas Dubois de Chemant, made the first successful porcelain dentures at the Guerhard porcelain factory [5, 7].

A new era was marked for dental prosthetics after Charles Goodyear in 1850 invented the vulcanization process. In this process, rubber was hardened in the presence of sulphur to produce a material call vulcanite, this material was not