# 25 year trend of retiring CERN employees' health status by professional categories

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European Organization for Nuclear Research

UNIVERSITÉ DE GENÈVE
FACULTÉ DE MÉDECINE

# Outline

The CERN project

Aim

Methods

Results

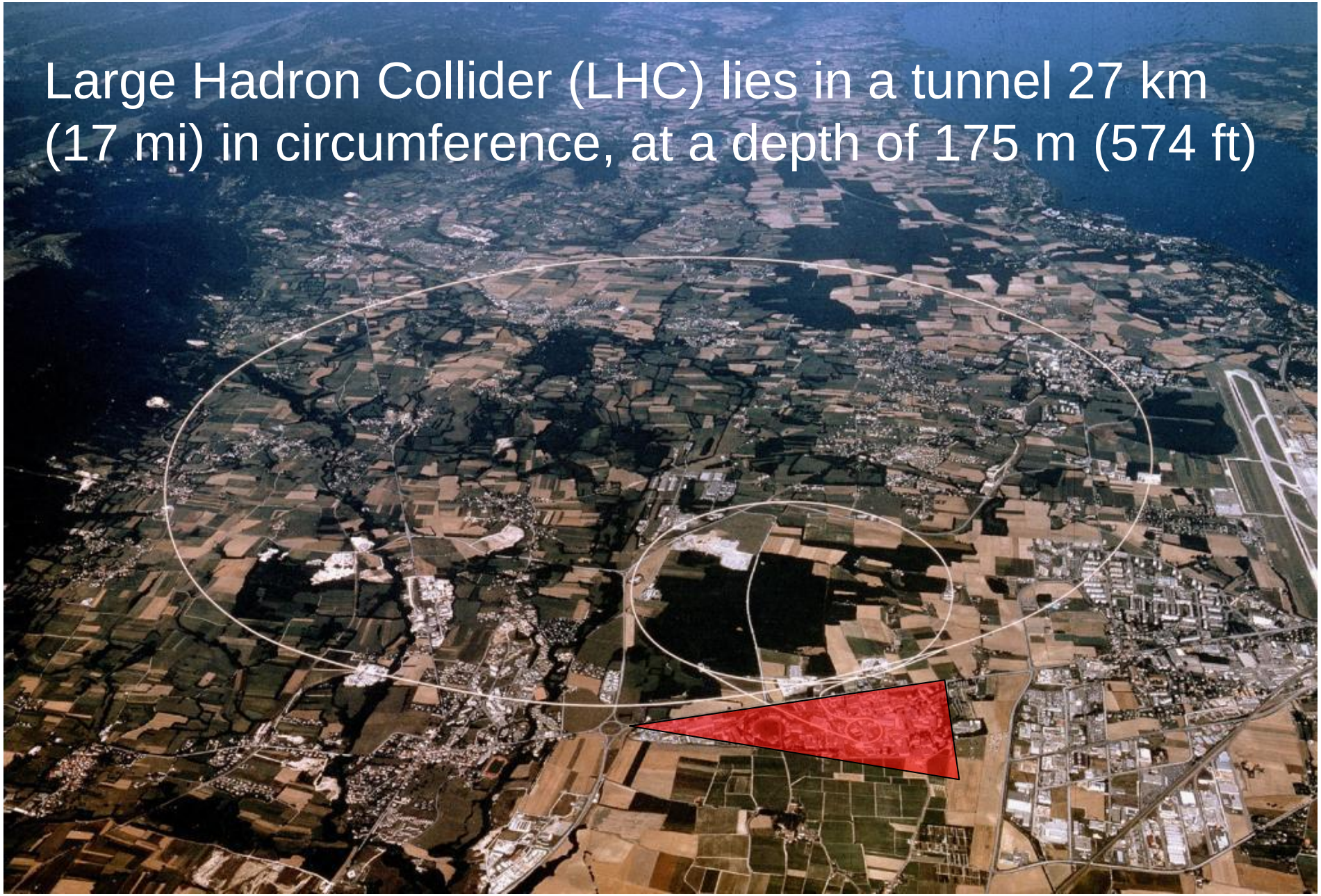
Comments


# European Organization for Nuclear Research

- Conseil Européen pour la Recherche Nucléaire
- European Council for Nuclear Research

- International organization who operates the world's largest particle physics laboratory

Large Hadron Collider (LHC) lies in a tunnel 27 km (17 mi) in circumference, at a depth of 175 m (574 ft)



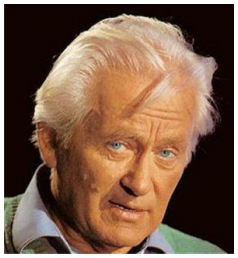
# CERN Scientific achievements

| | |
|---|---|
| 1973 | Neutral currents |
| 1983 | W and Z bosons |
| 1989 | Number of light neutrino families |
| 1995 | Creation of antihydrogen atoms |
| 1999 | Direct CP violation (charge-parity) |
| 2010 | Isolation of 38 atoms of antihydrogen |
| 2011 | Maintaining antihydrogen > 15 min |

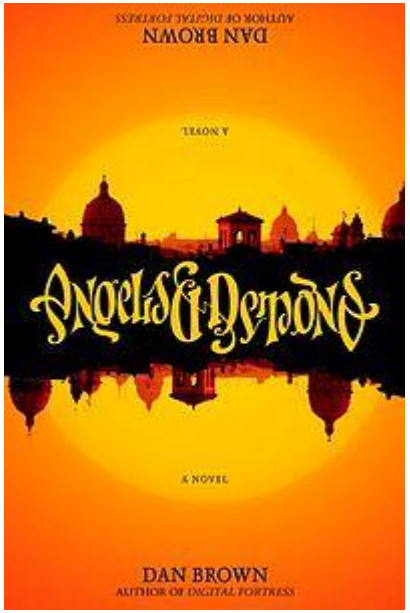
# CERN's Nobel Prize in physics

- 1984 Carlo Rubbia and Simon van der Meer for the developments that led to the discoveries of the W and Z bosons.

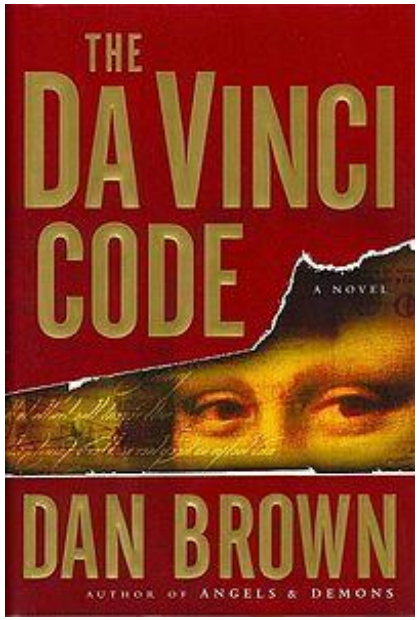
- 1992 Georges Charpak "for his invention and development of particle detectors."



# European Organization for Nuclear Research

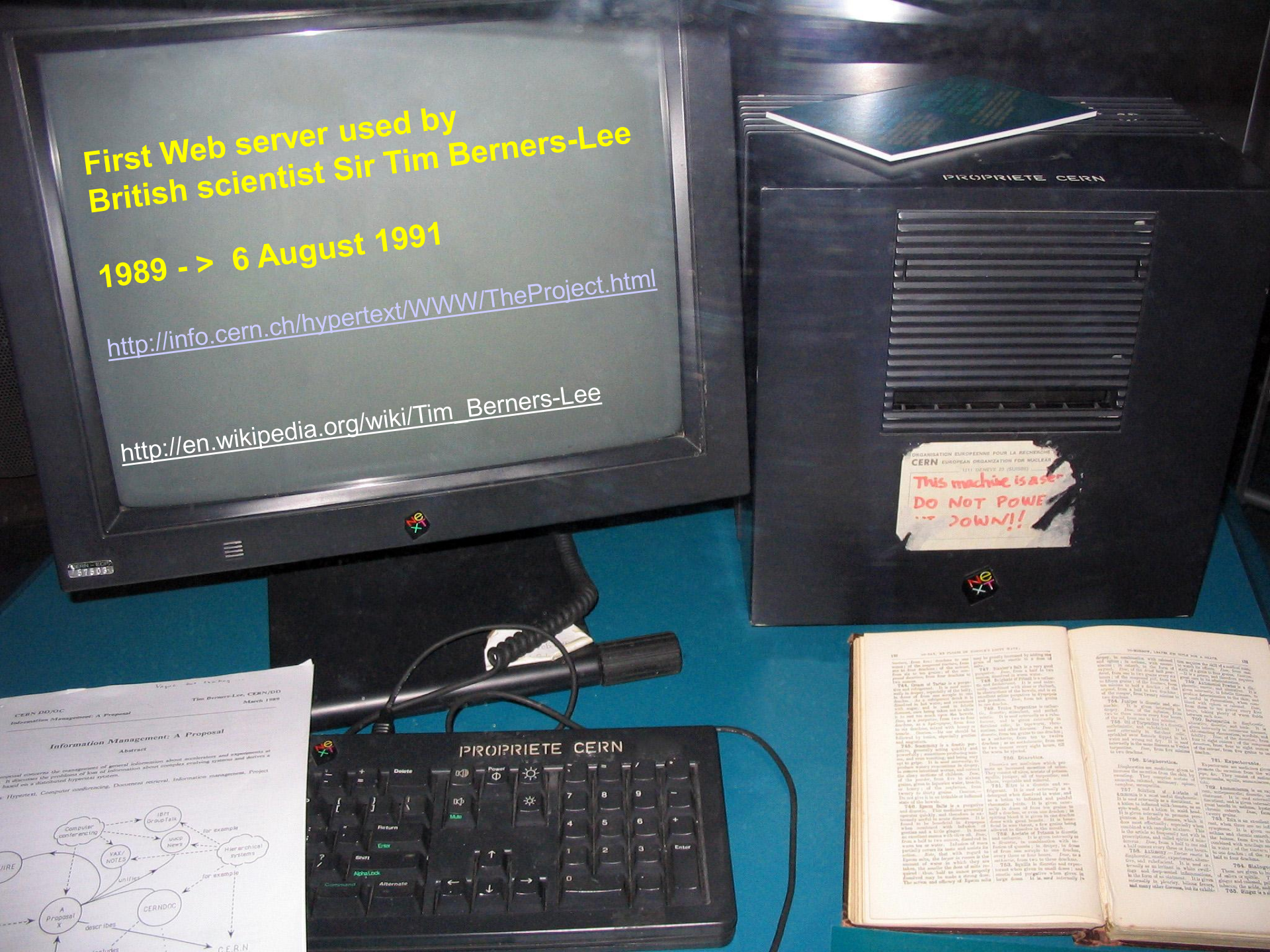



2000




2003


WHERE THE
WEB
WAS BORN
In the offices of this corridor, all the fundamental technologies of the World Wide Web were developed.
Started in 1990 from a proposal made by Tim Berners-Lee in 1989, the effort was first divided between an office in building 31 of the Computing and Networking Division (CN) and one in building 2 of the Electronics and Computing for Physics Division (ECP).
In 1991 the team came together in these offices, then belonging to ECP. It was composed of two CERN staff members, Tim Berners-Lee (GB) and Robert Cailliau (BE), aided by a number of Fellows, Technical Students, a Coopérant and Summer Students.
At the end of 1994 Tim Berners-Lee left CERN to direct the WWW Consortium (W3C), a world-wide organization devoted to leading the Web to its full potential. The W3C was founded with the help of CERN, the European Commission, the Massachusetts Institute of Technology (MIT), the Institut National pour la Recherche en Informatique et en Automatique (INRIA), and the Advanced Research Projects Agency (ARPA).
In 1995 Tim Berners-Lee and Robert Cailliau received the ACM Software System Award for the World Wide Web. In 2004, Tim Berners-Lee was awarded the first Millenium Technology Prize by the Finnish Technology Award Foundation.
The CERN Library
June 2004


First Web server used by
British scientist Sir Tim Berners-Lee
1989 - > 6 August 1991
http://info.cern.ch/hypertext/WWW/TheProject.html
http://en.wikipedia.org/wiki/Tim_Berners-Lee
PROPRIETE CERN
CERN EUROPEAN ORGANIZATION FOR NUCLEAR
This machine is a ser
DO NOT POWE
DOWN!!
PROPRIETE CERN
Information Management: A Proposal
Abstract
Computer conferencing
Hierarchical systems
CERNDOC
describes

# The CERN STUDY: Aims

- To describe the characteristics of the CERN active, retired and deceased populations
- To assess cognitive decline and its relationship with:
  - Education
  - Cardiovascular risk factors (CVRF)
  - The concept of Brain Reserve

# Why CERN?

- Large size working population

  *(~2400 actives and ~2500 retirees)*

- European-wide
- Mostly male (80%)
- Most living in the large Geneva area

  *(France and Switzerland)*

# Why CERN?

## Stimulating and competitive intellectual working environment

- Long academic education
- Long term projects managed by large international teams
- Computer literacy
- Strong interest for research

## High quality computerized records with unique ID

- Physical and biological exam every 2 years, and systematically done before retirement
- Coded medical diagnosis
- Health insurance and pension records

# The CERN study

0 Feasibility

1 Retrospective

2 Cross-sectional (questionnaire)

3 Cross-sectional (assessment)

4 Longitudinal cohort

# Aim

To describe, over time and across professional categories, the trends of cardio-vascular risk factors (CVRF) in a population who benefited from long term working contract and shared the same access to health care.

# Outline

The CERN project

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# Data bases

## Human resources *(1952 - 2009)*

- Demographics (N = 6427 )
- Languages
- Education and diplomas
- Professional activities history
- Sick leaves

## Pension database

- Survival

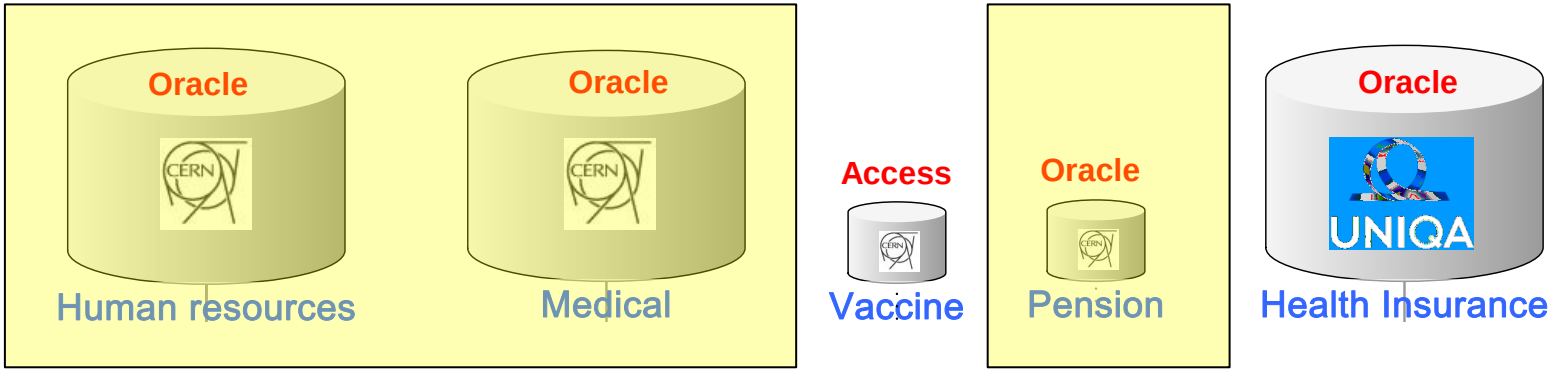
# Data bases

## Medical *(1968 - 2008)*

Every 2 years examination

- Anthropometric measures (height, weight)
- Life habits
- Professional risk factors
- Blood pressure
- Blood analyses
- Sensory impairment (audiograms)
- Medical diagnosis according to internal classification
- (Vaccinations)

# Data bases




**Stata**

# Retired population definition

- Male CERN employees
- Aged 55 to 70 years
- Last medical examination before departure
- Height, Blood Pressure and Professional Categories available

# Statistics

**ANOVA**

**Linear, logistic, ordered logistic and Cox regression models**

To quantify the effect of

- Age
- 5 years time period
- 3 professional categories

# Outline

The CERN project

Aim

Methods

Results

Comments

# Population characteristics

| Professional class | 1984 | 1989 | 1994 | 1999 | 2004 | Total | % |
|---|---|---|---|---|---|---|---|
| Manual, Crafts & Trades | 71 | 135 | 119 | 95 | 44 | 464 | 22.7 |
| Office & Administrative | 13 | 19 | 20 | 18 | 25 | 95 | 4.7 |
| Technical | 62 | 180 | 226 | 231 | 159 | 858 | 42.1 |
| Scientific & Engineering | 63 | 95 | 128 | 180 | 157 | 623 | 30.5 |
| Total | 209 | 429 | 493 | 524 | 385 | 2040 | |

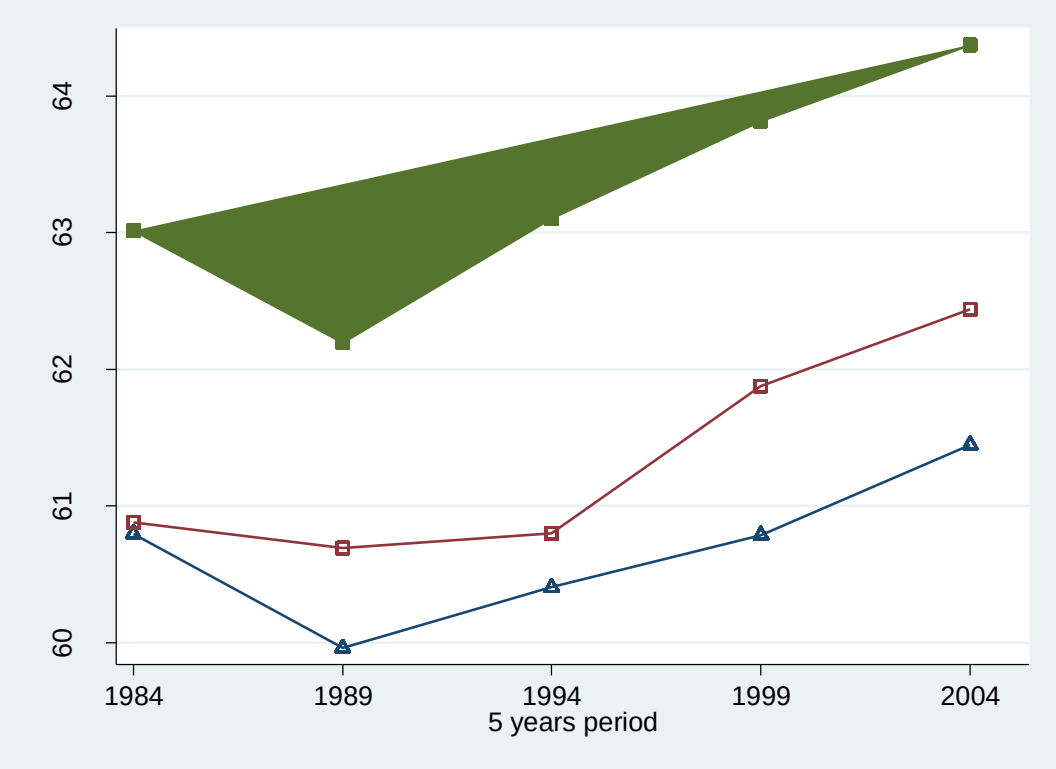
# Population characteristics

| Professional class | Frequency | Percent |
|---|---|---|
| Manual work, Crafts & Trades Administrative work | 559 | 27.5 |
| Technical work | 858 | 42.1 |
| Scientific & Engineering Work | 623 | 30.5 |
| Total | **2040** | **100** |

# **Retirement age** [year] by profession and time period

(N = 2040 CERN retirees)

**5 years period**



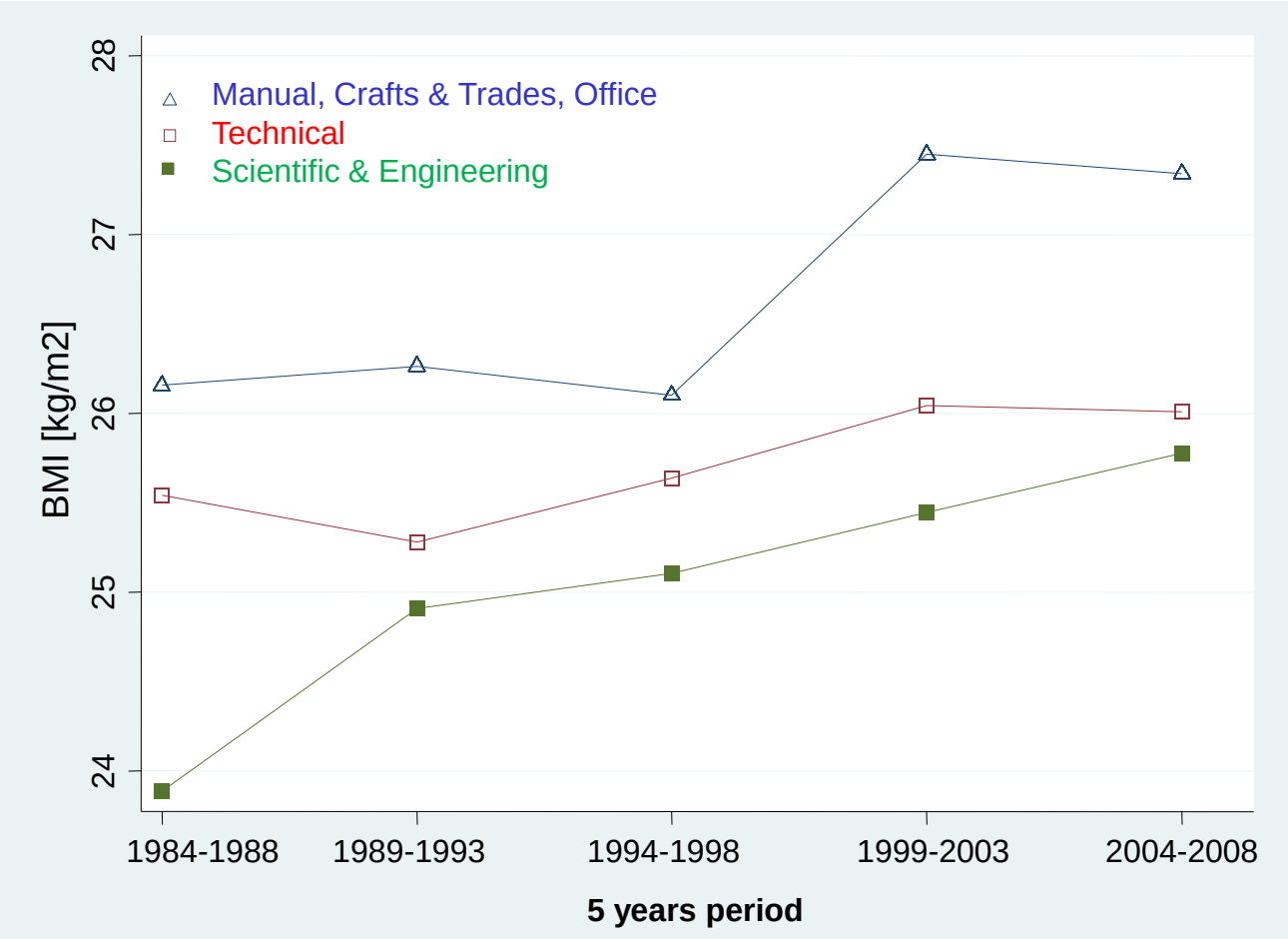

△ Manual, Crafts & Trades, Office

□ Technical

■ Scientific & Engineering

# **BMI** [kg/m$^2$] by profession and time period

(N = 2040 CERN retirees)



# BMI [kg/m$^2$] by profession and time period
## (N = 2040 CERN retirees)

| BMI | | Regression Beta | 95% CI | P | Anova P |
|---|---|---|---|---|---|
| **Period effect** | | | | | **<0.001** |
| | 1984 | -1.14 | [-1.68;-0.60] | <0.001 | |
| | 1989 | -0.88 | [-1.33;-0.42] | <0.001 | |
| | 1994 | -0.70 | [-1.13;-0.27] | 0.001 | |
| | 1999 | -0.08 | [-0.50;0.34] | 0.699 | |
| | 2004 | 0.00 | | | |
| **Profession** | | | | | **<0.001** |
| | Manual work, Crafts & Trades or Administrative work | 1.56 | [1.16;1.96] | <0.001 | |
| | Technical work | 0.58 | [0.23;0.93] | 0.001 | |
| | Scientific & Engineering Work | 0.00 | | | |
| | **Age** | 0.00 | [-0.05;0.06] | 0.872 | **0.796** |
| | **Constant** | 25.35 | [21.75;28.95] | <0.001 | |
| | **Adjusted $R^2$** | 0.039 | | <0.001 | |
| | **Period * Profession** | | | | **0.280** |

# BMI [kg/m$^2$] by profession and time period
## (N = 2040 CERN retirees)

| BMI | | Regression Beta | 95% CI | P | Anova P |
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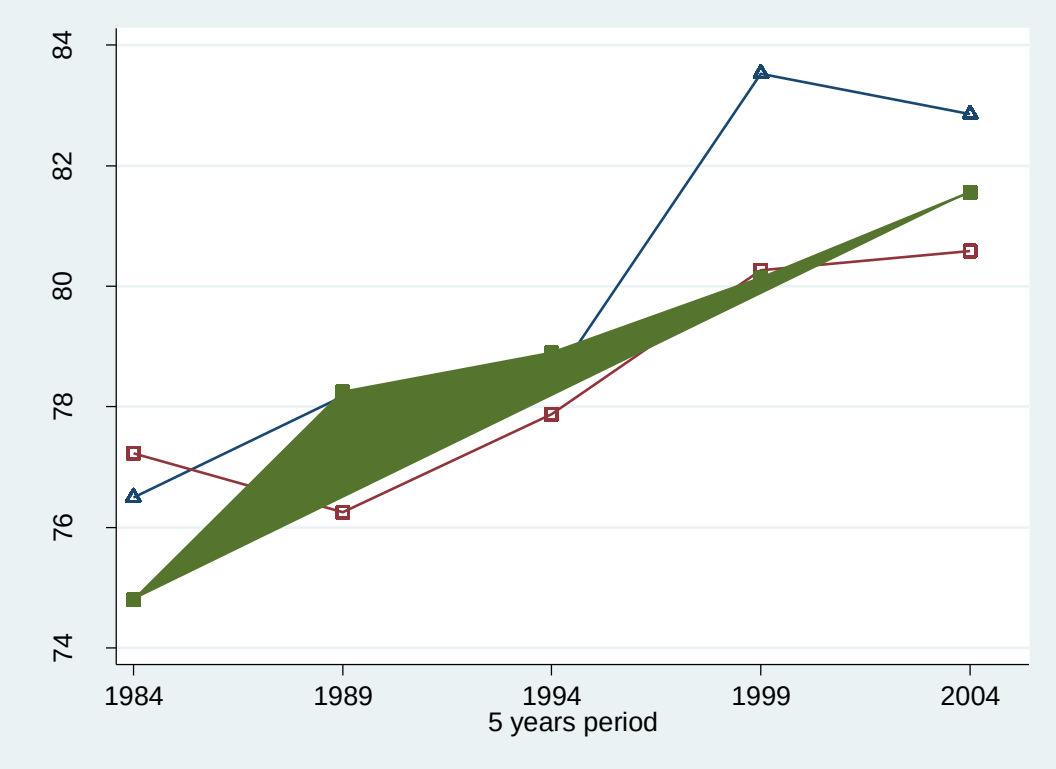
| | **Period * Profession** | | | | **0.280** |

# **Weight** [kg] by profession and time period

## (N = 2040 CERN retirees)

**5 years period**




△ Manual, Crafts & Trades, Office

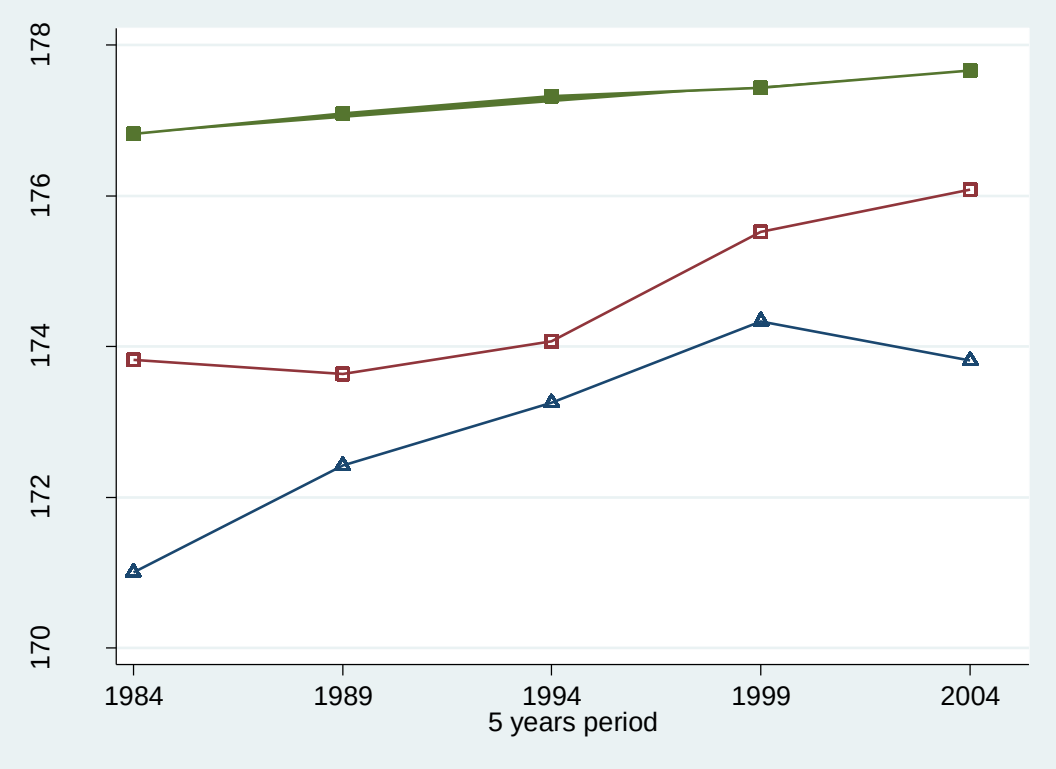
□ Technical

■ Scientific & Engineering

# **Height** [cm] by profession and time period

## (N = 2040 CERN retirees)

**5 years period**




△ Manual, Crafts & Trades, Office

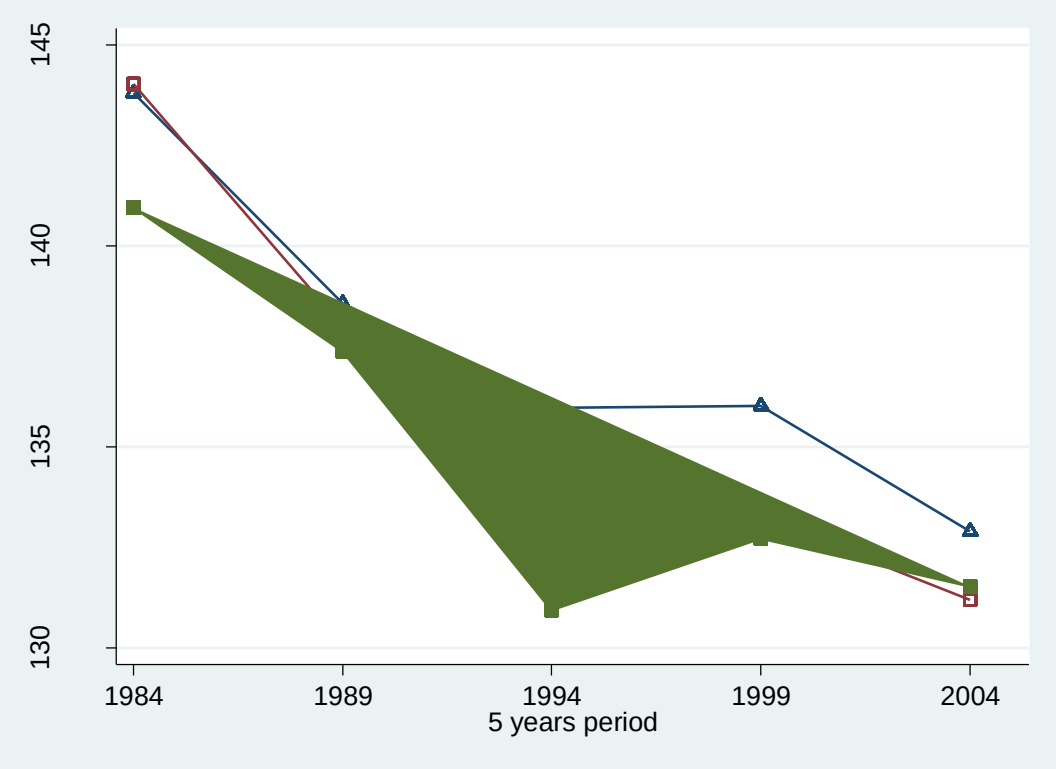
□ Technical

■ Scientific & Engineering

# Systolic BP [mmHg] by profession and time period

## (N = 2040 CERN retirees)

**5 years period**




△ Manual, Crafts & Trades, Office

□ Technical

■ Scientific & Engineering

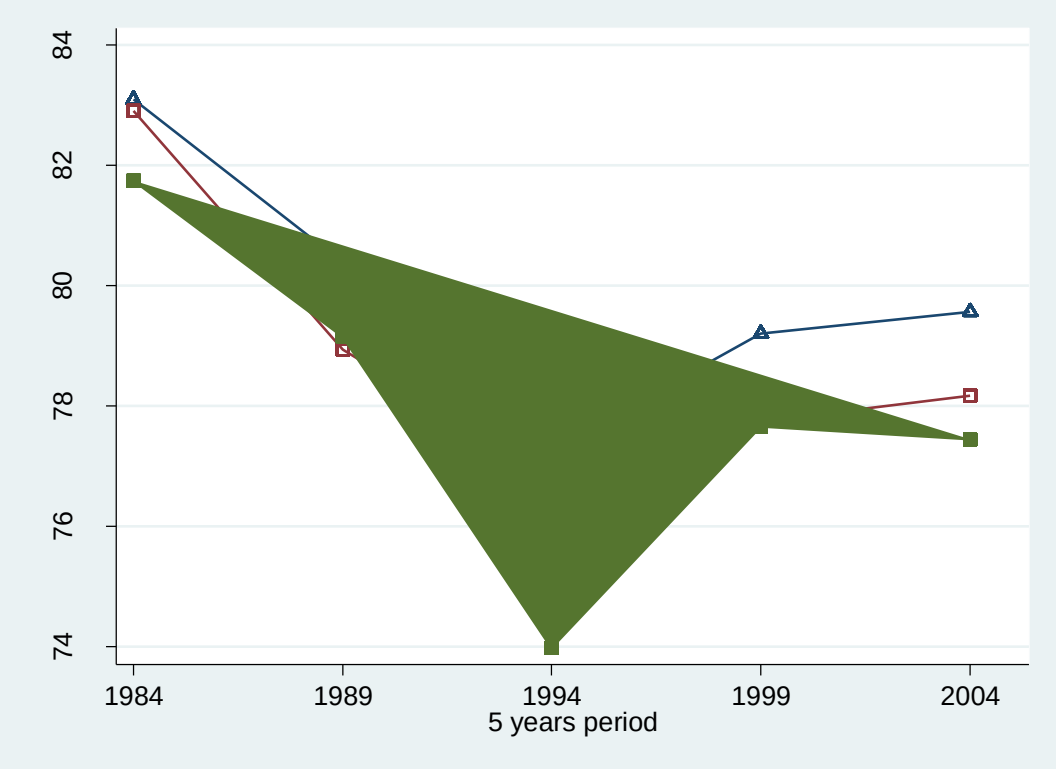
# Systolic BP [mmHg] by profession and time period
(N = 2040 CERN retirees)

| Systolic blood pressure | | Regression Beta | 95% CI | P | Anova P |
|---|---|---|---|---|---|
| **Period effect** | | | | | **< 0.001** |
| | 1984 | 11.38 | [8.65;14.12] | <0.001 | |
| | 1989 | 6.61 | [4.33;8.90] | <0.001 | |
| | 1994 | 2.63 | [0.45;4.81] | 0.018 | |
| | 1999 | 2.12 | [0.00;4.23] | 0.050 | |
| | 2004 | 0.00 | | | |
| **Profession** | | | | | **< 0.001** |
| Manual work, Crafts & Trades or Administrative work | | 3.71 | [1.71;5.71] | <0.001 | |
| Technical work | | 2.06 | [0.32;3.81] | 0.021 | |
| Scientific & Engineering Work | | 0.00 | | | |
| **Age** | | 0.38 | [0.10;0.66] | **0.008** | |
| **Constant** | | 106.23 | [88.08;124.38] | **<0.001** | |
| **Adjusted $R^2$** | | 0.042 | | **<0.001** | |
| **Period * Profession** | | | | | **0.793** |

# Diastolic BP [mmHg] by profession and time period

(N = 2040 CERN retirees)

**5 years period**

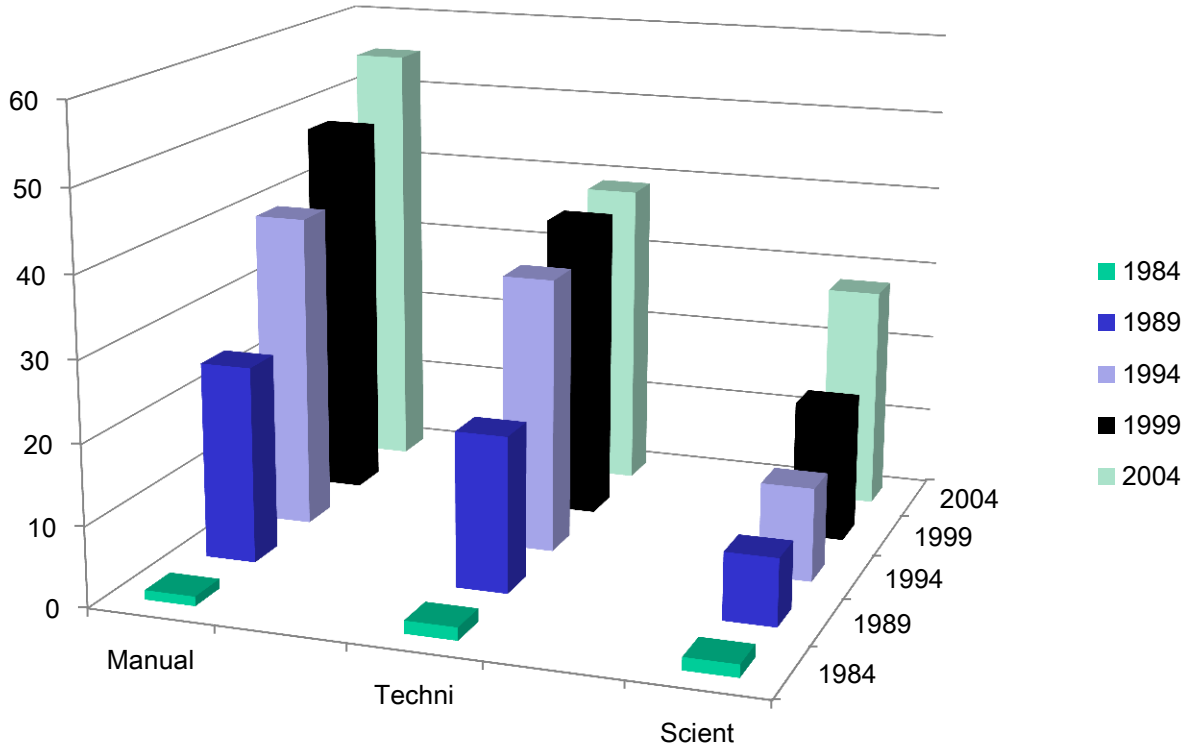



△ Manual, Crafts & Trades, Office

□ Technical

■ Scientific & Engineering

# % Past /current smoker
## by profession and time period
(N = 2040 CERN retirees)



# Never, past or current smoker (ordered logistic)
## by profession and time period
### (N = 2040 CERN retirees)

| Past or current smoker | | Logistic regression OR | 95% CI | P |
|---|---|---|---|---|
| **Periods** | | | | |
| **1984** | | 0.02 | [0.01-0.06] | <0.001 |
| **1989** | | 0.27 | [0.19-0.37] | <0.001 |
| **1994** | | 0.54 | [0.41-0.73] | <0.001 |
| **1999** | | 0.76 | [0.57-1.00] | 0.000 |
| **2004** | | 1.00 | -- | -- |
| **Profession** | | | | |
| Manual, Crafts & Trades or Administrative | | 3.03 | [2.23-4.13] | <0.001 |
| Technical work | | 2.28 | [1.73-3.01] | <0.001 |
| Scientific & Engineering Work | | | | |
| | **Age** | 0.94 | [0.90-0.98] | 0.000 |

# Time trend

| ↑ significantly with time (higher value in 2004-08) | ↓ significantly with time (smaller value in 2004-08) | No significant trend during the period |
|---|---|---|
| **Weight** | **Systolic BP** | **OH*** |
| **Height** | **Diastolic BP** | **Obesity (BMI >30 kg/m$^2$)** |
| **BMI** | | **Diabetes*** |
| **Glycemia** | | **# CV risk factors** |
| **Total cholesterol** | | **HDL cholesterol** |
| **LDL cholesterol** | | **Renal function** |
| **Dyslipidemia*** | | |
| **Tobacco*** | | |
| **Hypertension*** | | |

* Reported data

# Scientists compared with others professionals

**Worked longer and retired later**

**More « psychological stress »,** but marginally significant after adjusting for age

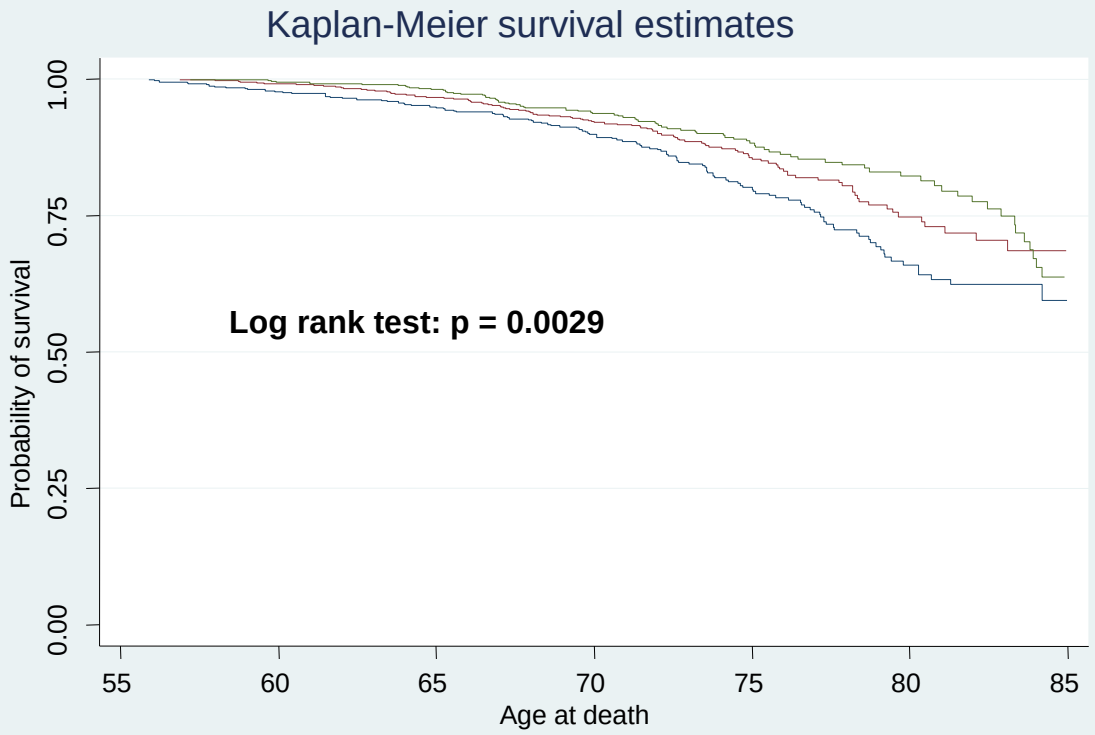
**Taller,** but lower BMI

**Lower or Less**

- Smoker, hypertension, dyslipidemia, diabetes, angor, infarctus rate
- Systolic and diastolic BP
- Triglycerides

# **Age at death** according to profession/education

(N = 323 deaths/ 2040 CERN retiree)




| **Number at risk** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Manual, Crafts & Trades, Office | 559 | 544 | 492 | 383 | 222 | 84 | 15 |
| Technical | 858 | 850 | 771 | 554 | 263 | 91 | 13 |
| Scientific & Engineering | 623 | 618 | 592 | 436 | 231 | 104 | 29 |

# Survival prediction - Cox models

(N=2040)

| Marker | | Crude | | |
|---|---|---|---|---|
| | | HR | 95% CI | p |
| Professional class | | | | |
| | Manual, Crafts & Trades, Office | 1.58 | [1.20-2.08] | 0.001 |
| | Technical | 1.16 | [0.88-1.53] | 0.307 |
| | Scientific & Engineering | 1.00 | [ --- --] | -- |
| Time period | | | | |
| | 1984-1988 | 1.35 | [0.77-2.34] | 0.293 |
| | 1989-1993 | 1.28 | [0.76-2.17] | 0.357 |
| | 1994-1998 | 1.16 | [0.68-1.97] | 0.583 |
| | 1999-2003 | 0.90 | [0.51-1.57] | 0.700 |
| | 2004-2008 | 1.00 | [ --- --] | -- |
| Duration of contract | | 0.99 | [0.97-1.01] | 0.527 |
| Age at enrollment | | 0.99 | [0.97-1.01] | 0.238 |
| Nb cardio-vascular risk factor | | | | |
| | 1 | 1.00 | [ --- --] | -- |
| | 2 | 1.49 | [1.16-1.93] | 0.002 |
| | 3 | 1.90 | [1.38-2.61] | 0.000 |
| | 4 | 2.89 | [1.46-5.73] | 0.002 |
| Systolic BP [mmHg] | | 1.01 | [1.01-1.02] | 0.000 |
| Diastolic BP [mmHg] | | 1.02 | [1.01-1.03] | 0.000 |
| Pulsed BP [mmHg] | | 1.02 | [1.01-1.02] | 0.001 |
| Height | | 1.01 | [0.99-1.03] | 0.275 |
| BMI [kg/m2] | | | | |
| | <22 | 1.22 | [0.85-1.77] | 0.284 |
| | 22.0-24.9 | 1.00 | [ --- --] | -- |
| | 25.0-29.9 | 0.98 | [0.76-1.26] | 0.875 |
| | >= 30 | 1.50 | [1.03-2.20] | 0.036 |
| Smoker | | | | |
| | Never | 1.00 | [ --- --] | -- |
| | Past | 0.81 | [0.54-1.22] | 0.312 |
| | Current | 2.04 | [1.50-2.76] | 0.000 |
| Alcool | | 3.01 | [2.20-4.11] | 0.000 |
| Diabetes | | 1.77 | [1.21-2.58] | 0.003 |
| Married | | 1.09 | [0.73-1.63] | 0.664 |
| Treated hypertension | | 1.39 | [1.01-1.92] | 0.041 |
| Psychological stress | | 1.20 | [0.88-1.63] | 0.248 |
| Dyslipidemia | | 0.86 | [0.63-1.17] | 0.328 |
| European Region | | | | |
| | South | 0.79 | [0.50-1.25] | 0.315 |
| | Center | 1.00 | [ --- --] | -- |
| | North | 0.96 | [0.74-1.24] | 0.739 |

# Survival prediction - Cox models

(N=2040)

| Marker | | Crude | | | Adjusted full model 1 | | |
|---|---|---|---|---|---|---|---|
| | | HR | 95% CI | p | HR | 95% CI | p |
| Professional class | | | | | | | |
| | Manual, Crafts & Trades, Office | 1.58 | [1.20-2.08] | 0.001 | 1.35 | [0.95-1.92] | 0.090 |
| | Technical | 1.16 | [0.88-1.53] | 0.307 | 1.05 | [0.76-1.44] | 0.774 |
| | Scientific & Engineering | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| Time period | | | | | | | |
| | 1984-1988 | 1.35 | [0.77-2.34] | 0.293 | 1.59 | [0.85-3.01] | 0.149 |
| | 1989-1993 | 1.28 | [0.76-2.17] | 0.357 | 1.46 | [0.81-2.65] | 0.208 |
| | 1994-1998 | 1.16 | [0.68-1.97] | 0.583 | 1.36 | [0.77-2.39] | 0.285 |
| | 1999-2003 | 0.90 | [0.51-1.57] | 0.700 | 1.05 | [0.59-1.87] | 0.865 |
| | 2004-2008 | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| Duration of contract | | 0.99 | [0.97-1.01] | 0.527 | 0.96 | [0.91-1.01] | 0.119 |
| Age at enrollment | | 0.99 | [0.97-1.01] | 0.238 | 0.95 | [0.90-0.99] | 0.030 |
| Nb cardio-vascular risk factor | | | | | | | |
| | 1 | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| | 2 | 1.49 | [1.16-1.93] | 0.002 | 1.37 | [1.06-1.77] | 0.017 |
| | 3 | 1.90 | [1.38-2.61] | 0.000 | 1.69 | [1.21-2.35] | 0.002 |
| | 4 | 2.89 | [1.46-5.73] | 0.002 | 2.46 | [1.23-4.94] | 0.011 |
| Systolic BP [mmHg] | | 1.01 | [1.01-1.02] | 0.000 | | | |
| Diastolic BP [mmHg] | | 1.02 | [1.01-1.03] | 0.000 | | | |
| Pulsed BP [mmHg] | | 1.02 | [1.01-1.02] | 0.001 | | | |
| Height | | 1.01 | [0.99-1.03] | 0.275 | 1.01 | [0.99-1.03] | 0.192 |
| BMI [kg/m2] | | | | | | | |
| | <22 | 1.22 | [0.85-1.77] | 0.284 | | | |
| | 22.0-24.9 | 1.00 | [ --- --] | -- | | | |
| | 25.0-29.9 | 0.98 | [0.76-1.26] | 0.875 | | | |
| | >= 30 | 1.50 | [1.03-2.20] | 0.036 | | | |
| Smoker | | | | | | | |
| | Never | 1.00 | [ --- --] | -- | | | |
| | Past | 0.81 | [0.54-1.22] | 0.312 | | | |
| | Current | 2.04 | [1.50-2.76] | 0.000 | | | |
| Alcool | | 3.01 | [2.20-4.11] | 0.000 | 2.60 | [1.87-3.62] | 0.000 |
| Diabetes | | 1.77 | [1.21-2.58] | 0.003 | | | |
| Married | | 1.09 | [0.73-1.63] | 0.664 | 1.15 | [0.77-1.72] | 0.505 |
| Treated hypertension | | 1.39 | [1.01-1.92] | 0.041 | | | |
| Psychological stress | | 1.20 | [0.88-1.63] | 0.248 | 1.29 | [0.94-1.77] | 0.113 |
| Dyslipidemia | | 0.86 | [0.63-1.17] | 0.328 | | | |
| European Region | | | | | | | |
| | South | 0.79 | [0.50-1.25] | 0.315 | 0.87 | [0.55-1.39] | 0.567 |
| | Center | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| | North | 0.96 | [0.74-1.24] | 0.739 | 1.07 | [0.78-1.47] | 0.666 |

# Survival prediction - Cox models

(N=2040)

| Marker | | Crude | | | Adjusted full model 1 | | | Adjusted full model 2 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | HR | 95% CI | p | HR | 95% CI | p | HR | 95% CI | p |
| Professional class | | | | | | | | | | |
| | Manual, Crafts & Trades, Office | 1.58 | [1.20-2.08] | 0.001 | 1.35 | [0.95-1.92] | 0.090 | 1.35 | [0.94-1.92] | 0.102 |
| | Technical | 1.16 | [0.88-1.53] | 0.307 | 1.05 | [0.76-1.44] | 0.774 | 1.06 | [0.77-1.45] | 0.739 |
| | Scientific & Engineering | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| Time period | | | | | | | | | | |
| | 1984-1988 | 1.35 | [0.77-2.34] | 0.293 | 1.59 | [0.85-3.01] | 0.149 | 1.31 | [0.68-2.55] | 0.423 |
| | 1989-1993 | 1.28 | [0.76-2.17] | 0.357 | 1.46 | [0.81-2.65] | 0.208 | 1.30 | [0.71-2.39] | 0.398 |
| | 1994-1998 | 1.16 | [0.68-1.97] | 0.583 | 1.36 | [0.77-2.39] | 0.285 | 1.23 | [0.69-2.18] | 0.478 |
| | 1999-2003 | 0.90 | [0.51-1.57] | 0.700 | 1.05 | [0.59-1.87] | 0.865 | 0.94 | [0.53-1.67] | 0.824 |
| | 2004-2008 | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| Duration of contract | | 0.99 | [0.97-1.01] | 0.527 | 0.96 | [0.91-1.01] | 0.119 | 0.96 | [0.91-1.01] | 0.126 |
| Age at enrollment | | 0.99 | [0.97-1.01] | 0.238 | 0.95 | [0.90-0.99] | 0.030 | 0.95 | [0.91-1.00] | 0.038 |
| Nb cardio-vascular risk factor | | | | | | | | | | |
| | 1 | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- | | | |
| | 2 | 1.49 | [1.16-1.93] | 0.002 | 1.37 | [1.06-1.77] | 0.017 | | | |
| | 3 | 1.90 | [1.38-2.61] | 0.000 | 1.69 | [1.21-2.35] | 0.002 | | | |
| | 4 | 2.89 | [1.46-5.73] | 0.002 | 2.46 | [1.23-4.94] | 0.011 | | | |
| Systolic BP [mmHg] | | 1.01 | [1.01-1.02] | 0.000 | | | | 1.01 | [0.94-1.09] | 0.775 |
| Diastolic BP [mmHg] | | 1.02 | [1.01-1.03] | 0.000 | | | | 1.00 | [0.93-1.08] | 0.942 |
| Pulsed BP [mmHg] | | 1.02 | [1.01-1.02] | 0.001 | | | | 1.00 | [0.92-1.08] | 0.922 |
| Height | | 1.01 | [0.99-1.03] | 0.275 | 1.01 | [0.99-1.03] | 0.192 | 1.01 | [1.00-1.03] | 0.154 |
| BMI [kg/m2] | | | | | | | | | | |
| | <22 | 1.22 | [0.85-1.77] | 0.284 | | | | 1.17 | [0.80-1.71] | 0.414 |
| | 22.0-24.9 | 1.00 | [ --- --] | -- | | | | 1.00 | [ --- --] | -- |
| | 25.0-29.9 | 0.98 | [0.76-1.26] | 0.875 | | | | 0.91 | [0.71-1.18] | 0.491 |
| | >= 30 | 1.50 | [1.03-2.20] | 0.036 | | | | 1.16 | [0.78-1.74] | 0.458 |
| Smoker | | | | | | | | | | |
| | Never | 1.00 | [ --- --] | -- | | | | 1.00 | [ --- --] | -- |
| | Past | 0.81 | [0.54-1.22] | 0.312 | | | | 0.81 | [0.54-1.24] | 0.338 |
| | Current | 2.04 | [1.50-2.76] | 0.000 | | | | 1.67 | [1.19-2.34] | 0.003 |
| Alcool | | 3.01 | [2.20-4.11] | 0.000 | 2.60 | [1.87-3.62] | 0.000 | 2.12 | [1.49-3.02] | 0.000 |
| Diabetes | | 1.77 | [1.21-2.58] | 0.003 | | | | 1.50 | [1.01-2.22] | 0.046 |
| Married | | 1.09 | [0.73-1.63] | 0.664 | 1.15 | [0.77-1.72] | 0.505 | 1.18 | [0.79-1.78] | 0.420 |
| Treated hypertension | | 1.39 | [1.01-1.92] | 0.041 | | | | 1.08 | [0.77-1.51] | 0.672 |
| Psychological stress | | 1.20 | [0.88-1.63] | 0.248 | 1.29 | [0.94-1.77] | 0.113 | 1.27 | [0.92-1.74] | 0.146 |
| Dyslipidemia | | 0.86 | [0.63-1.17] | 0.328 | | | | 0.80 | [0.57-1.10] | 0.168 |
| European Region | | | | | | | | | | |
| | South | 0.79 | [0.50-1.25] | 0.315 | 0.87 | [0.55-1.39] | 0.567 | 0.83 | [0.52-1.32] | 0.430 |
| | Center | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- | 1.00 | [ --- --] | -- |
| | North | 0.96 | [0.74-1.24] | 0.739 | 1.07 | [0.78-1.47] | 0.666 | 1.04 | [0.76-1.43] | 0.784 |

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# Long-term trends in the longevity of scientific elites: Evidence from the British and the Russian academies of science

**Evgeny M. Andreev[1], Dmitri Jdanov[1], Vladimir M. Shkolnikov[1] and David A. Leon[2]**

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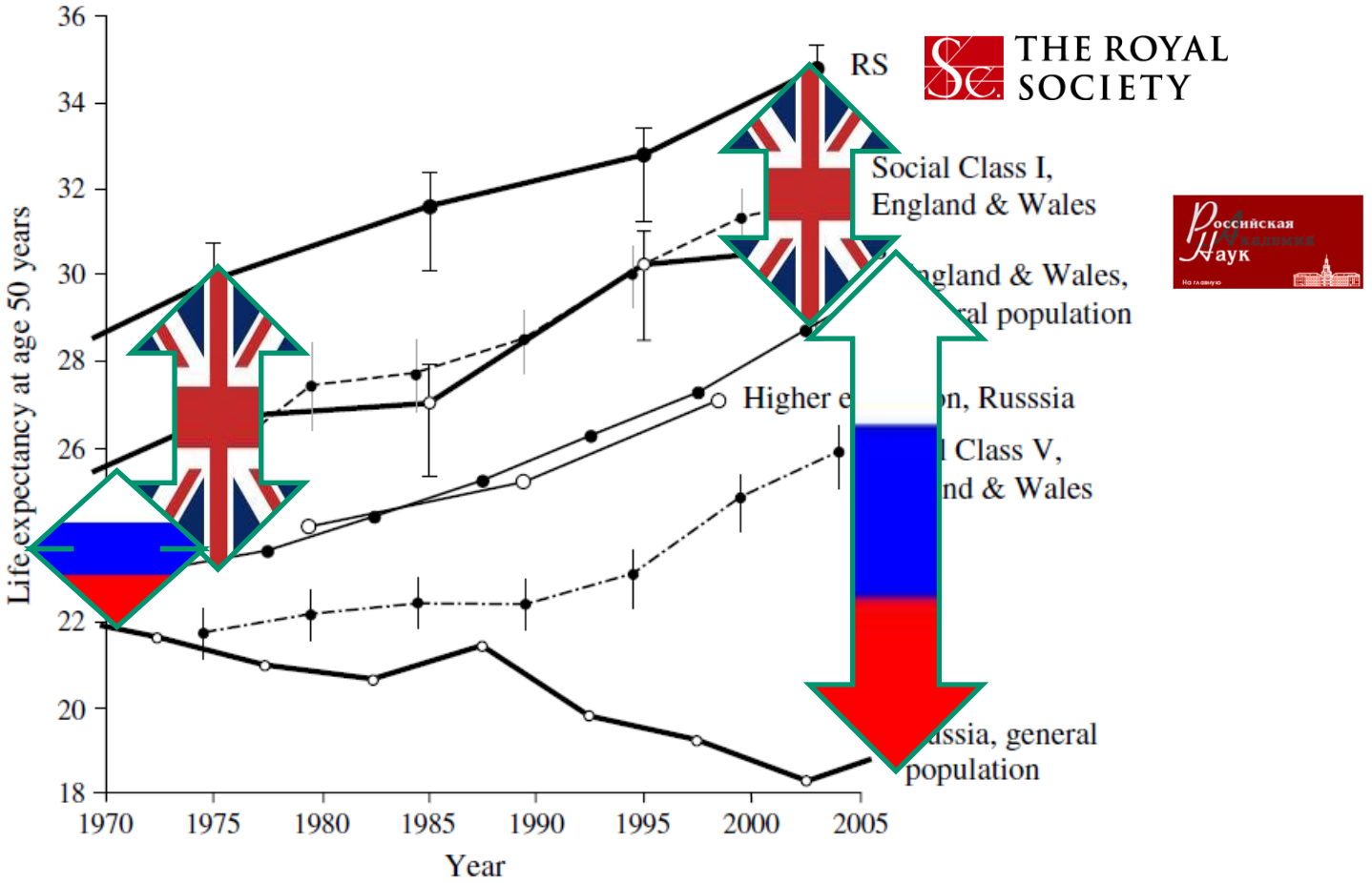
# LE at 50 by calendar period for the Royal Society and the general male populations of England and Wales

**Table 3** Life expectancy at age 50 by calendar period for the Royal Society and the general male populations of England and Wales

| Calendar period | Royal Society | England and Wales, males | Difference between RS and England and Wales, males |
|---|---|---|---|
| 1660–99 | 18.4 (16.9, 19.8)[1] | | |
| 1700–49 | 18.1 (17.1, 19.1) | | |
| 1750–99 | 20.2 (19.4, 20.9) | | |
| 1800–49 | 22.2 (21.5, 22.7) | 19.6[2] | 2.6 (1.9, 3.1) |
| 1850–74 | 22.1 (21.1, 22.9) | 19.5 | 2.6 (1.6, 3.3) |
| 1875–99 | 23.0 (21.9, 23.7) | 19.0 | 4.0 (2.9, 4.8) |
| 1900–24 | 24.5 (23.4, 25.4) | 20.2 | 4.3 (3.2, 5.2) |
| 1925–49 | 24.6 (23.5, 25.3) | 21.9 | 2.6 (1.6, 3.3) |
| 1950–59 | 26.5 (24.5, 27.7) | 22.5 | 4.0 (2.0, 5.2) |
| 1960–69 | 27.7 (25.9, 28.8) | 22.9 | 4.8 (3.1, 5.9) |
| 1970–79 | 29.5 (27.6, 30.3) | 23.4 | 6.0 (4.2, 6.9) |
| 1980–89 | 31.9 (30.2, 32.6) | 24.8 | 7.1 (5.4, 7.8) |
| 1990–99 | 33.1 (31.5, 33.8) | 26.8 | 6.3 (4.7, 7.0) |
| 2000–2006 | 35.2 (33.5, 35.6) | 29.0 | 6.2 (4.5, 6.6) |

E. M. Andreev *et al., Popul Stud (Camb)* ***65, 319-34 (2011).***

# LE at 50 after 1970 for the Royal Society (RS) and the Russian Academy of Sciences (RAS) vs respective general population




E. M. Andreev *et al., Popul Stud (Camb)* ***65, 319-34 (2011).***

# LE in relation to CVRF: 38 year follow-up of 19 000 men in the Whitehall study

- "Uncertainty about relevance of CVRF for prediction of life expectancy
- Presence of 3 major risk factors vs none (smoking, ↑blood pressure,↑ cholesterol) recorded on a single occasion … associated with a 10 y shorter life span from age 50 (23.7 v 33.3 years)"

R. Clarke *et al., BMJ 339, b3513 (2009)*

# Hazard ratios for vascular and non-vascular mortality and LE by CVRF

| Risk factors* at baseline | Prevalence at baseline (%) | Vascular deaths | | Non-vascular deaths | | Mean (SE) life expectancy at age 50 |
|---|---|---|---|---|---|---|
| | | Deaths | HR† (95% CI) | Deaths | HR (95% CI) | |
| Non-smokers | | | | | | |
| Low SBP, low cholesterol | 17.0 | 701 | 1.0 | 955 | 1.0 | 33.3 (0.2) |
| Low SBP, high cholesterol | 17.2 | 861 | 1.21 (1.09 to 1.33) | 995 | 1.03 (0.94 to 1.12) | 32.2 (0.2) |
| High SBP, low cholesterol | 10.9 | 749 | 1.76 (1.58 to 1.95) | 650 | 1.15 (1.04 to 1.27) | 29.9 (0.3) |
| High SBP, high cholesterol | 11.8 | 915 | 2.02 (1.83 to 2.23) | 648 | 1.08 (0.97 to 1.19) | 29.1 (0.3) |
| Smokers | | | | | | |
| Low SBP, low cholesterol | 13.5 | 654 | 1.48 (1.33 to 1.65) | 1086 | 1.86 (1.71 to 2.03) | 28.1 (0.2) |
| Low SBP, high cholesterol | 13.5 | 841 | 1.96 (1.77 to 2.16) | 954 | 1.68 (1.53 to 1.83) | 27.3 (0.3) |
| High SBP, low cholesterol | 7.9 | 552 | 2.42 (2.16 to 2.71) | 625 | 2.14 (1.93 to 2.37) | 24.3 (0.4) |
| High SBP, high cholesterol | 8.3 | 691 | 3.09 (2.78 to 3.44) | 544 | 1.91 (1.72 to 2.12) | 23.7 (0.4) |

SBP=systolic blood pressure.
*"Low" blood pressure is <140 mm Hg, "low" cholesterol is baseline cholesterol <5.0 mmol/l.
†Hazard ratios adjusted for age at risk and calendar period.

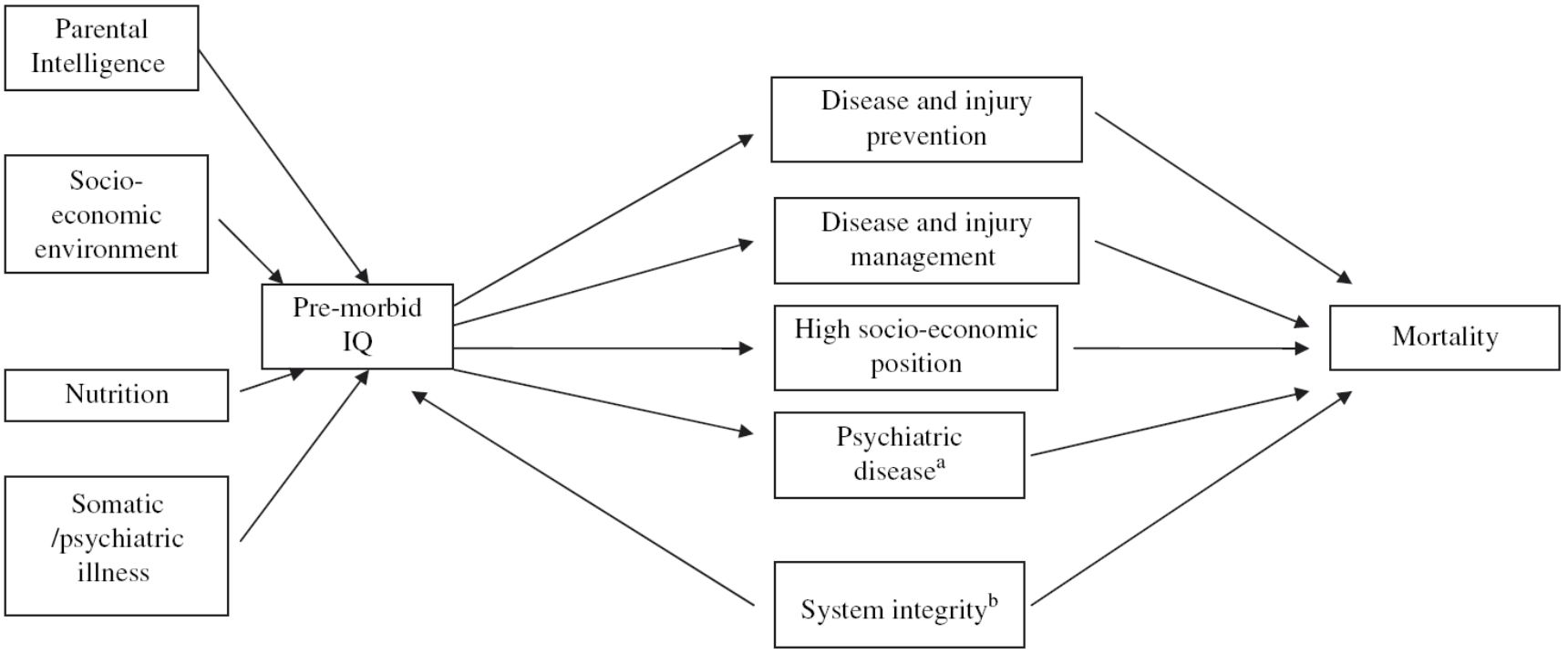
R. Clarke *et al., BMJ 339, b3513 (2009)*

# LE in relation to CVRF: 38 year follow-up of 19 000 men in the Whitehall study

- “More extreme categorisation of these risk factors including BMI, diabetes…, and employment grade was associated with a 15 year difference in life expectancy from age 50 (20.2 v 35.4 years)”

R. Clarke *et al., BMJ 339, b3513 (2009)*

# Explaination




G. D. Batty *et al.*, *Ann Epidemiol* **17**, 278-88 (2007)

# Discussion

Despite work stability and an equivalent access to health care, a health gradient was observed with scientists having the lowest prevalence in most cardio-vascular risk factors.

In univariate analysis being a manual, crafts & trades or office worker was associated with a shorter survival.

Nevertheless after adjusting for CVRF, professional categories was not associated with survival, whereas diabetes, OH and past/current smoking were.

# Limits

**Limits**

Incertitude regarding past/current smoking status in 1984-1988

**To be done**

Compute LE

Compare with LE of the general population

# Thanks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- Pr G. Gold & Pr. J-P. Michel
- Dr. S. Giannelli & C. Graf


SWISS FOUNDATION
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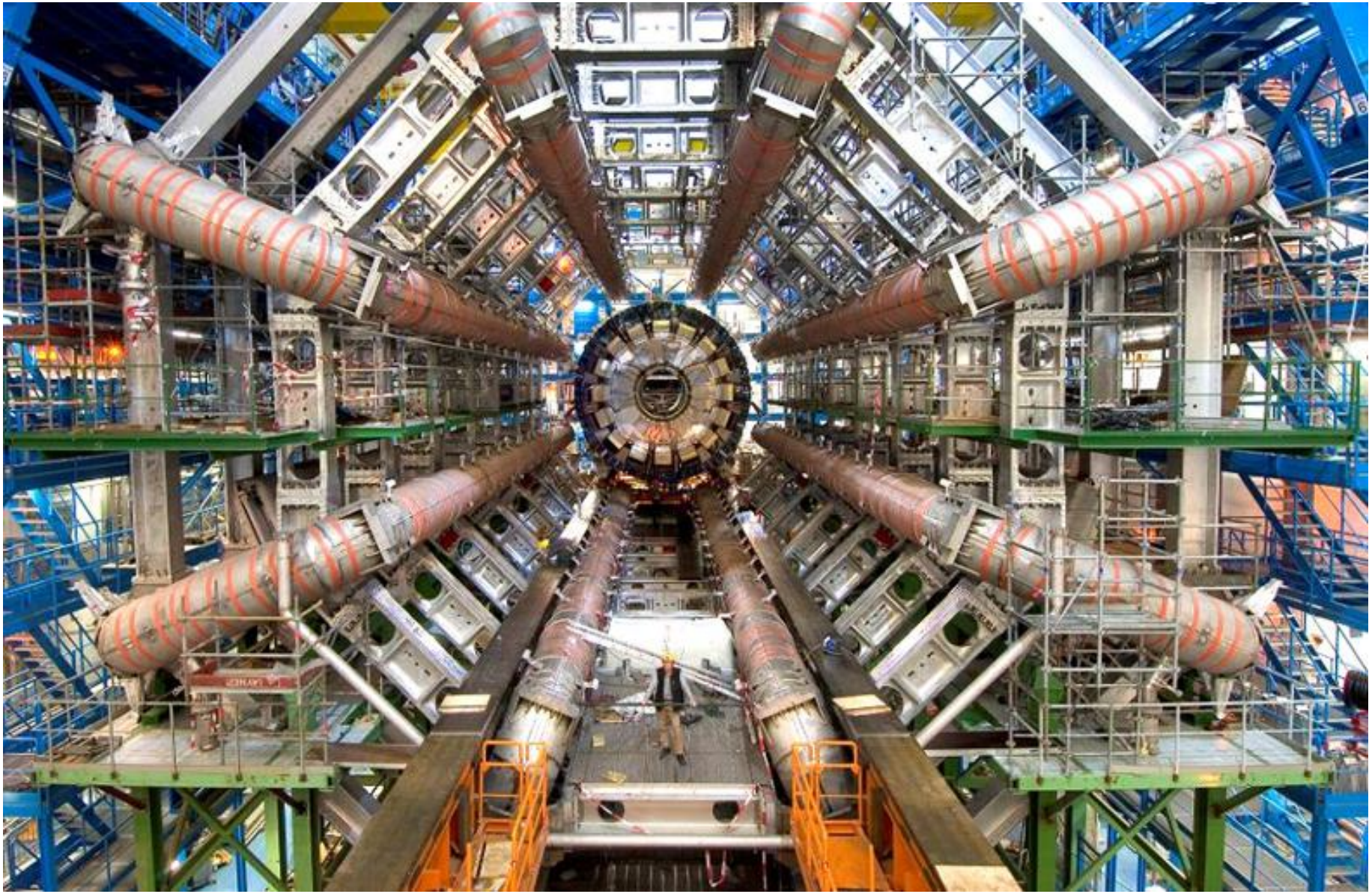
# Complex occupation and survival



# Nationalities

| rp_nationality_1 | European Region South | Center | North | Total |
|---|---|---|---|---|
| AT | 0 | 31 | 0 | 31 |
| BE | 0 | 0 | 48 | 48 |
| CH | 0 | 346 | 0 | 346 |
| DE | 0 | 0 | 162 | 162 |
| DK | 0 | 0 | 14 | 14 |
| ES | 16 | 0 | 0 | 16 |
| FI | 0 | 0 | 1 | 1 |
| FR | 0 | 1,075 | 0 | 1,075 |
| GB | 0 | 0 | 148 | 148 |
| GR | 5 | 0 | 0 | 5 |
| IT | 117 | 0 | 0 | 117 |
| LB | 0 | 0 | 1 | 1 |
| MT | 0 | 0 | 1 | 1 |
| NL | 0 | 0 | 44 | 44 |
| NO | 0 | 0 | 14 | 14 |
| NZ | 0 | 0 | 1 | 1 |
| SE | 0 | 0 | 14 | 14 |
| US | 0 | 0 | 1 | 1 |
| YU | 1 | 0 | 0 | 1 |
| Total | 139 | 1,452 | 449 | 2,040 |

# Education vs Cern work categories in 2008

| Career path recoded | Manual work, Crafts & Trades | Office & Administrative work | Technical work | Scientific & Engineering Work | Total |
|---|---|---|---|---|---|
| | | | | | |
| **A Long apprenticeship** | 134 | 24 | 1 | 0 | **159** |
| **B Specialised training** | 68 | 142 | 112 | 0 | **322** |
| **C Higher technical training** | 0 | 110 | 376 | 0 | **486** |
| **D Technical Engineer** | 0 | 37 | 369 | 0 | **406** |
| **E Uni deg Dr, Professional** | 0 | 1 | 0 | 689 | **690** |
| **F Uni deg Dr, Leadership** | 0 | 0 | 0 | 319 | **319** |
| **G Uni deg Dr, Highest resp.** | 0 | 0 | 0 | 133 | **133** |
| . | 0 | 0 | 0 | 4 | **4** |
| **Total** | **202** | **314** | **858** | **1'145** | **2'519** |