International Prevention Research Institute

From prospective cohort studies (with biobanking) and epidemiologic monitoring to science and evidence-based intervention

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"Prevention avoids the labour of being sick"

Thomas Adams (1618)

Some thoughts for the day I

Disraeli and Gladstone were the leaders of the two major political parties in Great Britain in the middle to late 19th Century. They did not like each other as can be surmised from the following dialogue:

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Once at a social gathering, Gladstone said to Disraeli, “I predict, Sir, that you will die either by hanging or of some vile disease’.

Disraeli replied, “That depends, sir, upon whether I embrace your principles or your mistress.”

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Some thoughts for the day II

Disraeli and Gladstone were the leaders of the two major political parties in the middle to late 19th Century in Great Britain. They did not like each other as can be surmised from the following dialogue:

In Parliament, Disraeli explained the difference between a misfortune and a calamity in the following terms:

“If Gladstone fell into the Thames, that would be a misfortune; and if anybody pulled him out, that I suppose would be a calamity.”

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Thoughts for the Day

- The increase in threats to Public Health which is taking place everywhere, especially in low-income and lower-middle income countries, could be described as a misfortune.
- If we fail to do anything about this situation which is upon us, then that will certainly be a calamity.

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Key Point to Remember

- ***Health*** is not ***Sickness*** nor is it simply the absence of sickness.
- Public Health is about the ***Health of Populations***.
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- Public Health is about the ***Health of Populations***.
- Life is a sexually transmitted disease which is invariably fatal.

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Epidemiology

We are at what is known as a ‘tipping point’ in the evolution of the science of Epidemiology.

The best definition of Epidemiology is that it is ‘the scientific study of the distribution and determinants of disease in man’ [MacMahon, 1972].

While there is still a need for classical epidemiological studies such as descriptive epidemiology, case-control and cohort studies, the need is much less than previously. These should focus on identifying and quantifying threats to human health.

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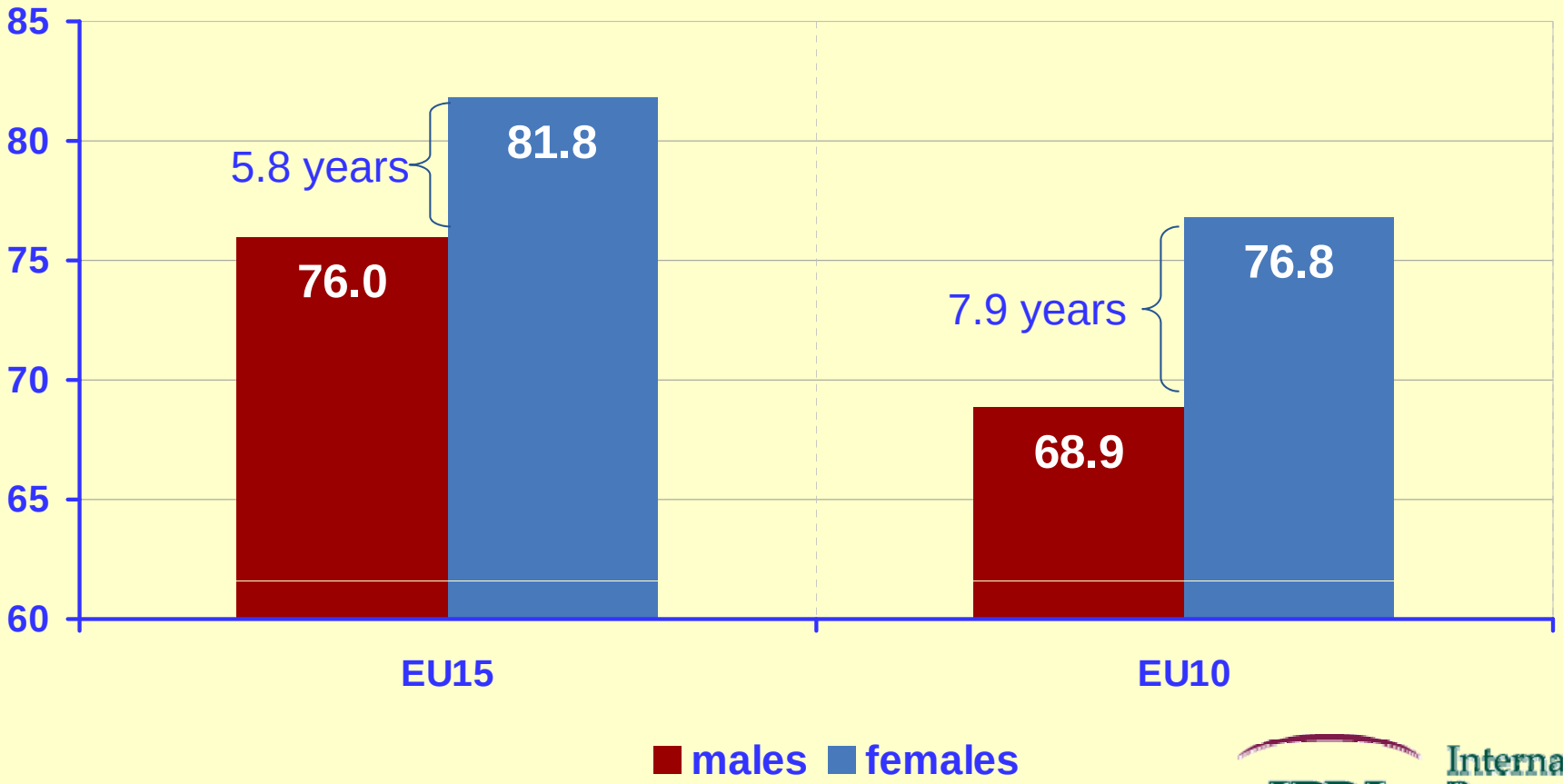
Life Expectancy in Men in EU10 compared with EU10 in 2002



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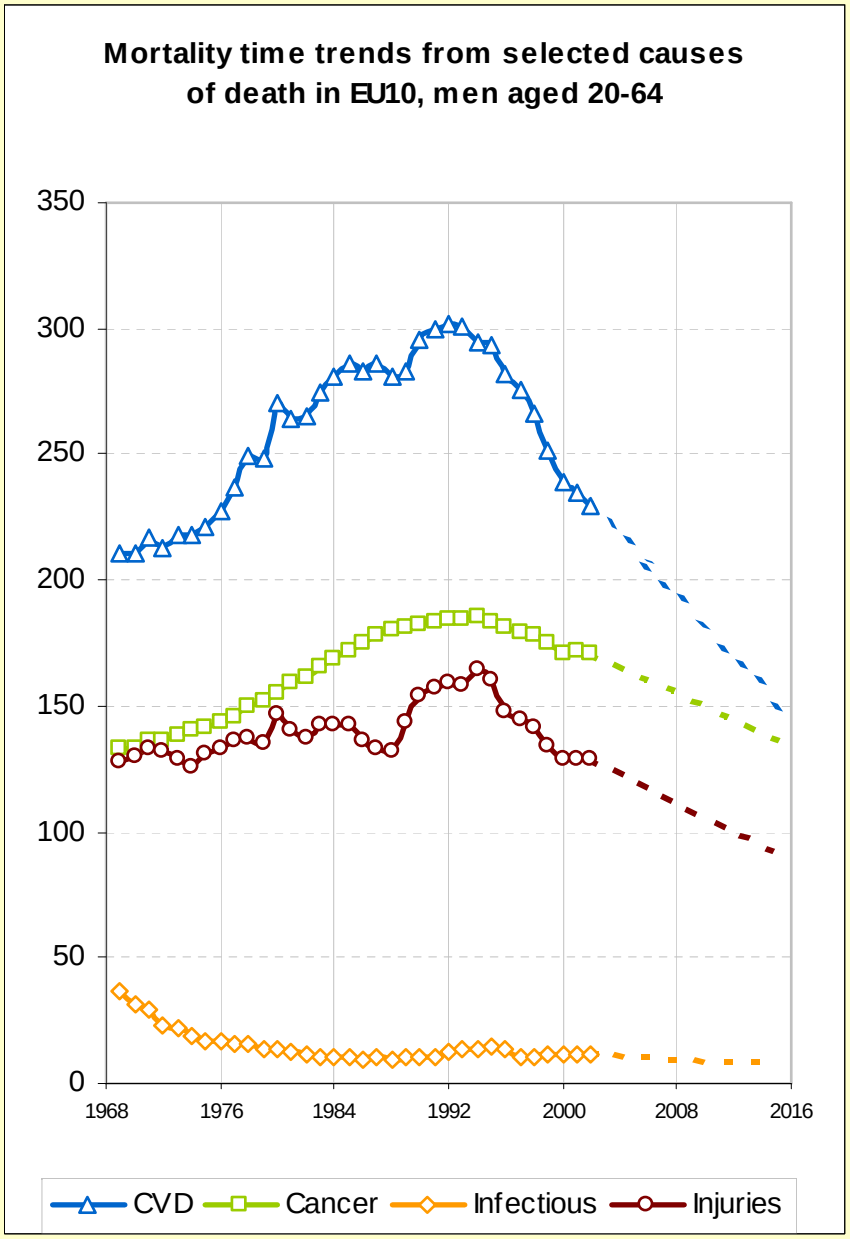

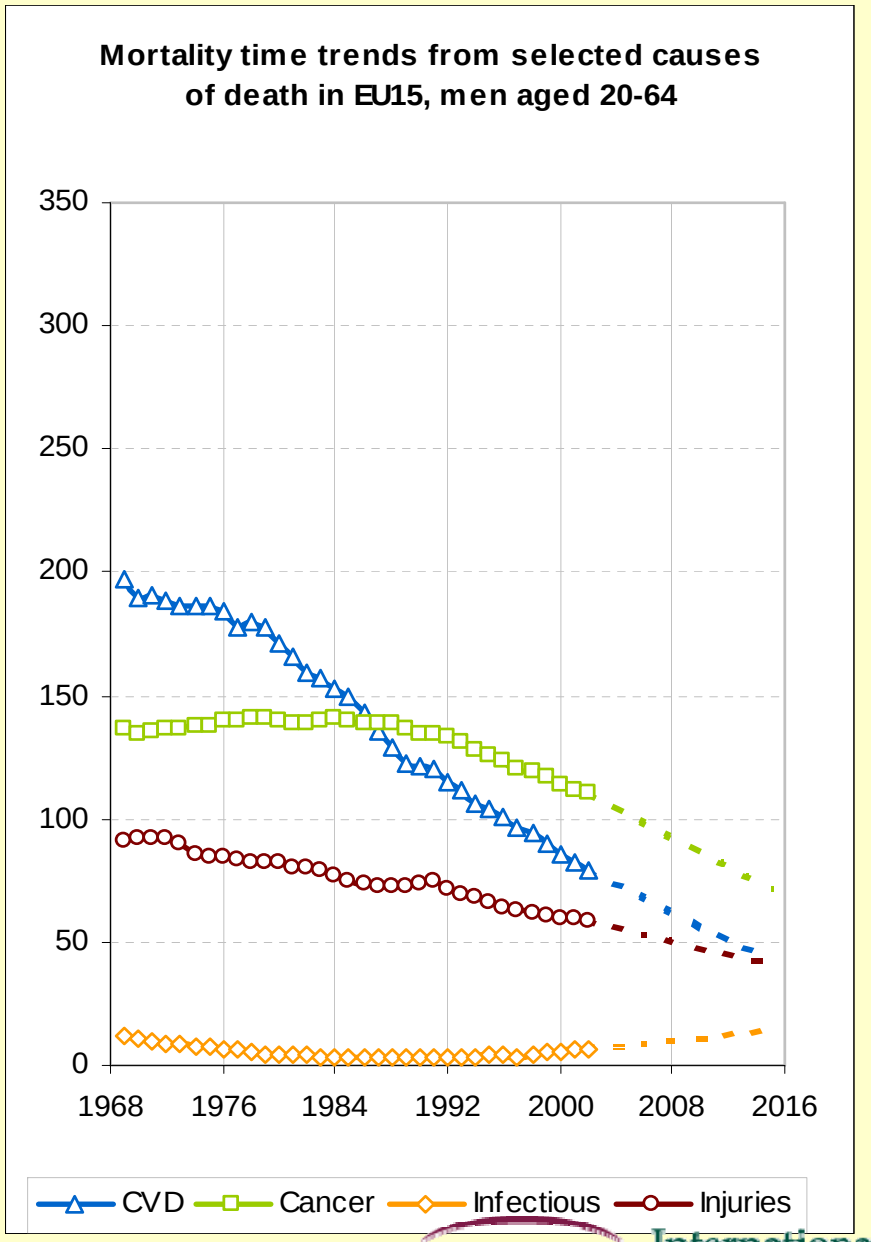

Zatonski, 2008

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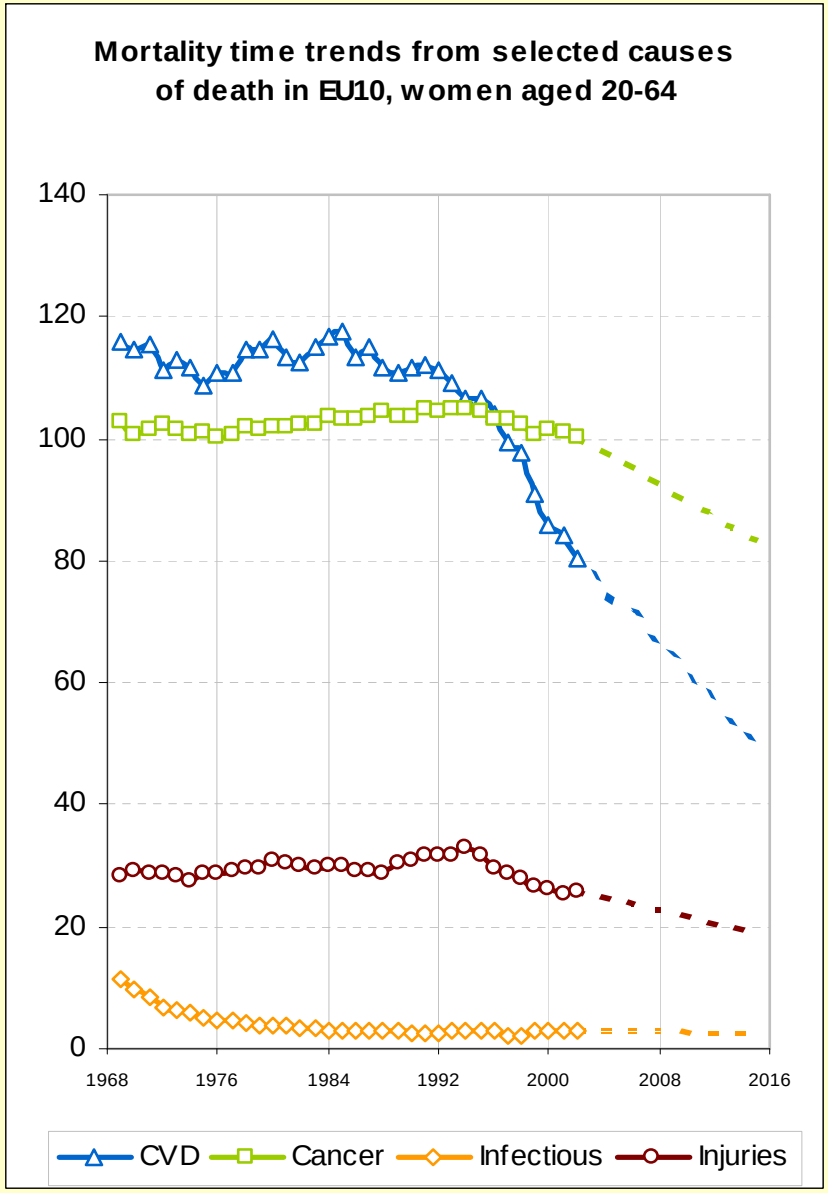

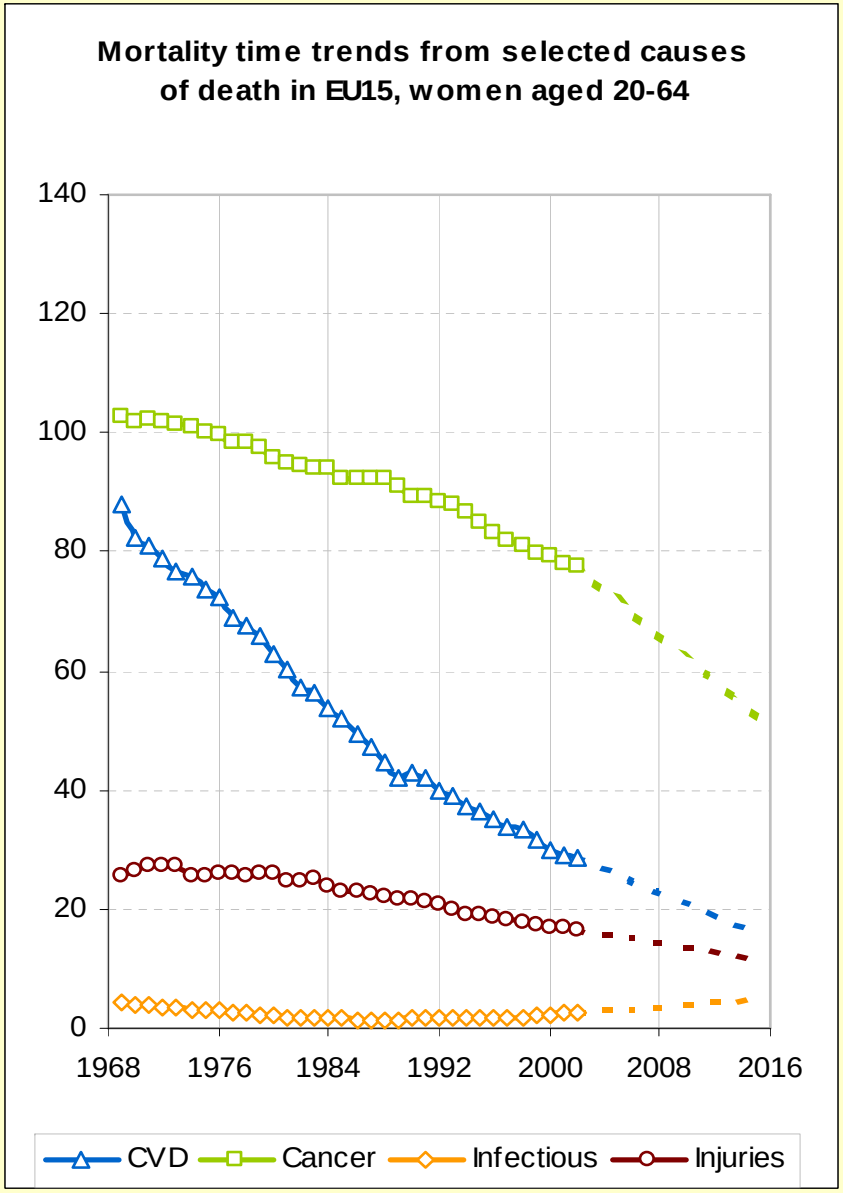

Zatonski, 2008

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Quantifying the Gap

- Cardiovascular mortality is 5 times higher in Bulgarian women than in French women.
- Lung cancer amongst Hungarian men is nearly 4 times more frequent than amongst Swedish men.
- The death rates from liver cirrhosis in Hungarian or Romanian men are more than 10 times higher than in men from the Netherlands or from Greece.
- Fatal injuries amongst men in the Baltic States (Lithuania, Latvia, Estonia) are about seven fold higher than in the Netherlands and the United Kingdom.

Zatonski, 2008

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- A major concern remains the high mortality rates in middle age (35-69) particularly in men, throughout Central and Eastern Europe.

- This results in lowering overall life expectancy and the loss of many years of life expectancy by the male populations. Many of these premature deaths may well be preventable by the adoption of an appropriate health policy.

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- This results in lowering overall life expectancy and the loss of many years of life expectancy by the male populations. Many of these premature deaths may well be preventable by the adoption of an appropriate health policy.

There is a clear need to know more about the risk factors for premature death in particular in Central and eastern Europe.

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- While several health policies have been put in place by Governments in the Region to reduce mortality rates and to improve health, it may take many years to see the decreases in mortality associated with the implementation of these policies.

- Indeed, if the policies do not have the desired effect on mortality reduction, many years may be wasted following a flawed policy.

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- Indeed, if the policies do not have the desired effect on mortality reduction, many years may be wasted following a flawed policy.

There is a clear need to have a system in place to monitor changes in biomarkers of health and health determinants in order to monitor change and the early signs of the impact of health policy.

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There is a clear need for capacity building in many areas of medical science in Central and Eastern Europe

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Investigating causes of chronic disease and monitoring changes in health status in Central and Eastern Europe

I Risk factors for premature death in Central and Eastern Europe

II Monitoring changes in biomarkers of health and health determinants in order to monitor change and the early signs of the impact of health policy.

III Capacity building in Medical Research in Central and Eastern Europe.

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I Risk factors for premature death in Central and Eastern Europe

It is proposed to establish a cohort of men and women in ten EU countries of Central and Eastern Europe in addition to the Russian Federation.

Initially the cohort shall comprise 50,000 men and 50,000 women in each country aged between 35 and 59. Each study subject shall complete a lifestyle questionnaire at recruitment to the study and provide a blood sample.

The blood sample will be prepared in a standard way and one half sent to the a central Biobank for central storage and the second half stored in a Biological Resource Centre which will be created in each country.

Each national Biological Resource Center will be established according to the Guidelines recently established following a consultative process.

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I Risk factors for premature death in Central and Eastern Europe

- Each study will require ethical clearance and each study subject shall be required to provide informed consent to participate. Each study subject will require to be followed up for major health events by every possible manner both passive and active. Details of follow-up shall be required to be developed taking the individual national situation into account.

- In this manner, a cohort shall be established to seek to identify risk factors for cancer, cardiovascular disease premature mortality and other common diseases throughout Central and Eastern Europe. Once such causes are established, preventive programs and policies can be developed to reduce or eliminate their impact on the population.

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II Monitoring changes in biomarkers of health and health determinants in order to monitor change and the early signs of the impact of health policy.

- In addition, it is proposed to undertake an annual ***Examination of the Health of the Population*** in each country. In each country, a stratified sample of 10,000 men and women (stratified on factors such as age, urban/rural residence, socioeconomic status) to monitor changes in biomarkers of health and health outcomes in response to changes in the lifestyle of the population, response to health care policy and in the delivery of health care.

- Each subject would undergo a general medical examination and have a blood sample drawn, some of which for analysis and some to be stored in the Biological Resource Center. Medical biomarkers such as blood pressure, blood lipids, blood sugar, lung function and serum markers of exposures to such as arsenic in the environment could be measured.

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II Monitoring changes in biomarkers of health and health determinants in order to monitor change and the early signs of the impact of health policy.

- Thus, if for example, a national public health policy to reduce cardiovascular deaths is developed, rather than wait 10-15 years to count the deaths, monitoring population blood pressure and lipids would give a clear indicator within short period of time if the target was likely to be achieved.

- If there were no changes in these biomarkers in response to public health policy, then the policy could be usefully re-evaluated.

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III Capacity building in Medical Research in Central and Eastern Europe.

- Medical Researchers from each country will be involved in the epidemiological and laboratory analyses of the collected data. iPRI will work on the development of the training of such scientists and will work with the countries to establish a network of collaborating Institutes in different parts of the world. Training is envisaged at all levels including training of technicians, doctoral students, post-docs, junior scientists and specialist training of more senior scientists in new procedures.

- The creation and development of national Biological Resource Centres is of great importance. Each country will have a major resource for the future development of capacity in medical science and medical research throughout Central and Eastern Europe.

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Investigating causes of chronic disease and monitoring changes in health status in Central and Eastern Europe

Meeting of Health Ministers from Accession Countries to discuss this proposal in Warsaw on 26th November 2007

I Risk factors for premature death in Central and Eastern Europe.

II Monitoring changes in biomarkers of health and health determinants in CEE countries and the early signs of the impact of health policy.

III Capacity building in Medical Research in Central and Eastern Europe.

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Warsaw Declaration. 26th November 2008

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Warsaw Declaration

10 January 2008

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PONS Study

- After this presentation you will hear about the PONS study in greater detail.
- This is a study of major significance for Poland and all of the region of central and eastern Europe.
- This is the prototypic study for what is needed in the region and will drive the ‘Warsaw Declaration’

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The Next Big Questions

- Why are we different?
- Why remain some healthy until old age?
- Why do some develop certain diseases?
- Why do some respond to therapy?
- Why do some develop adverse drug reactions?
- Why is there a health gap between West and East?

1000 genomes project
Cancer genome project
Innovative Medicines Initiative
Personalized medicine

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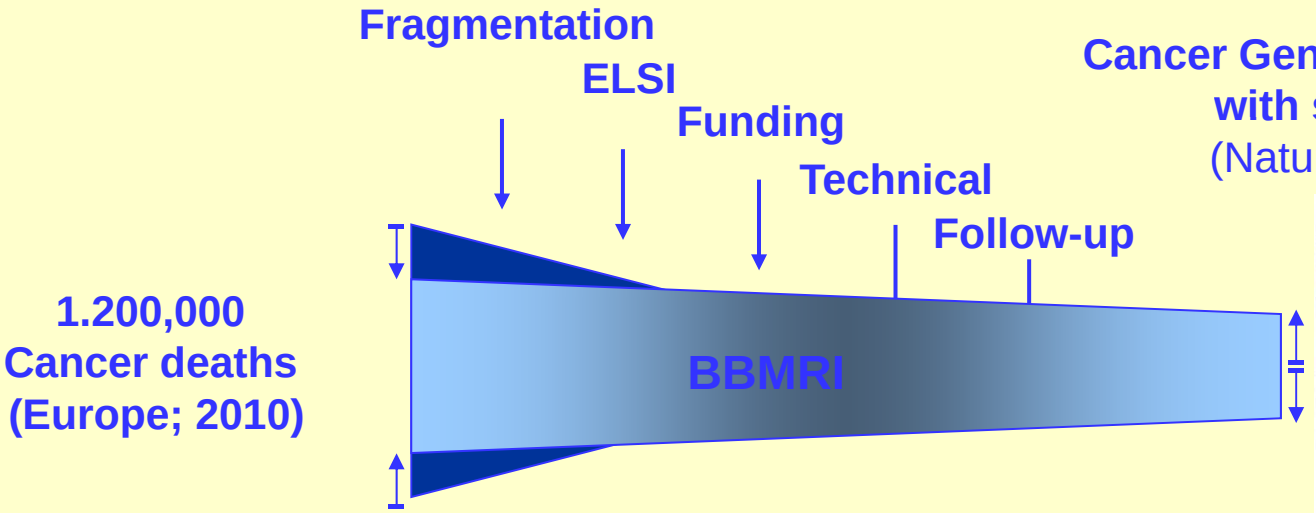
Biobanks in Medical Research



Cancer Genome Project struggels with sample shortage
(Nature Medicine 2007)

Long haul: The Lung Cancer Tissue Bank has only 20 of the 500 samples required.

- **NCI:** Biological samples are #1 roadblock
- **OECD:** Global Biological Resource Centre Network
- **WHO/IARC:** Standards for biological resource centres
- **ESF:** Science Policy Briefing: Need for integration
- **EU/ESFRI:** Research infrastructure for Biobanks and Biomolecular Resources (BBMRI)

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Key Components of BBMRI

Human biological samples and data

Healthy Population

Patients

Serum

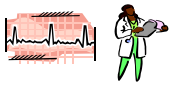
PBMC

DNA

FFPE tissues

Frozen tissues

Cells



Fam. history
Lab. param.
Treatm. outcome
Lifestyle

Analysis tools

Antibodies
Affinity binders
Recomb. proteins

Gene clone collections*
siRNA libraries*
Cell lines*
Model organisms*

Infrastructure

Sample storage

Data storage
Biocomputing

Application

Basic research
Life sciences

Targets for
Drug discovery

Biomarkers for
Drug development

New diagnostics

Personalized medicine
Public health

*: ESFRI BMS report but not funded

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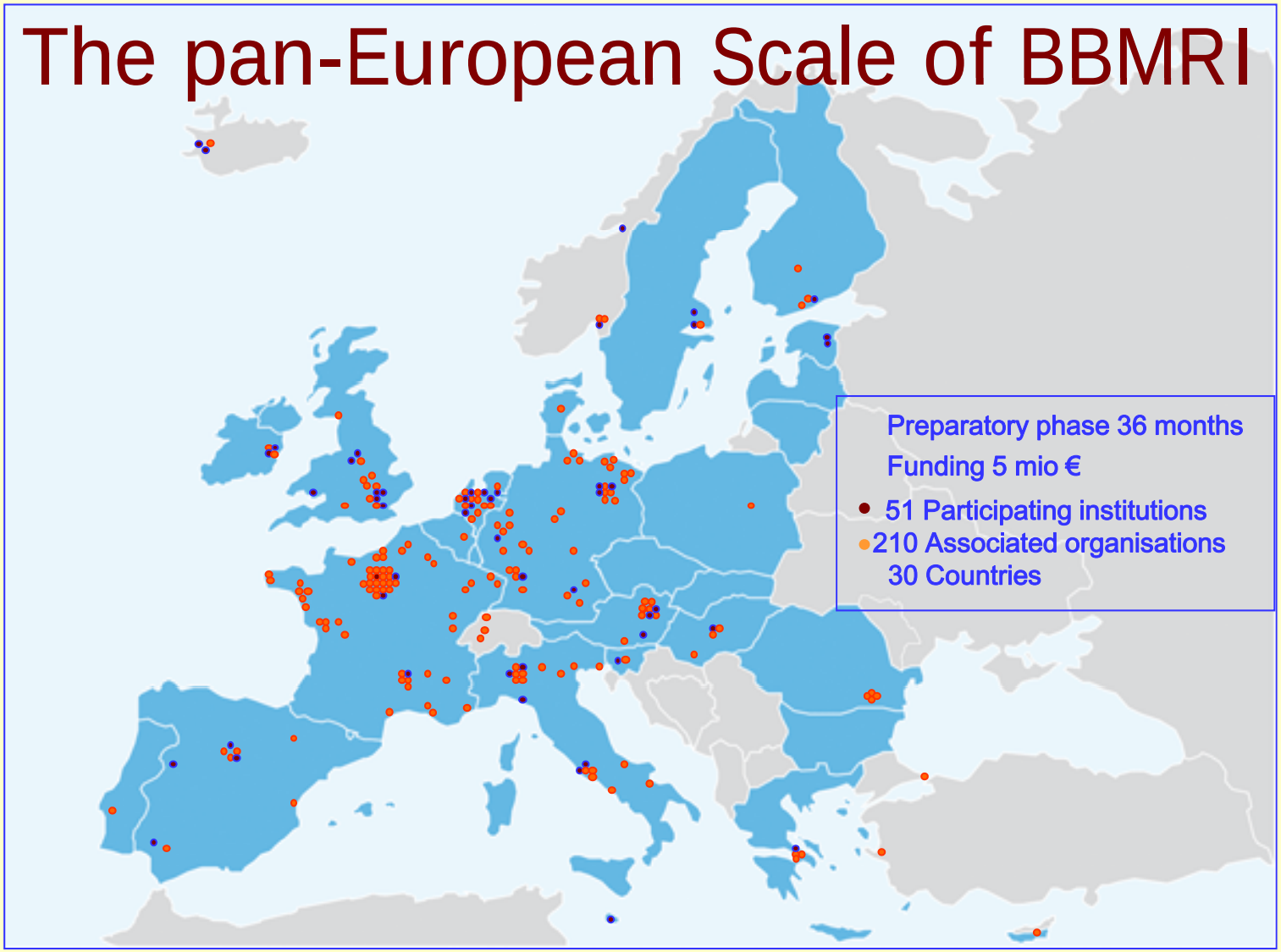
The pan-European Scale of BBMRI



The Challenges

- Harmonized processes (evidence-based standards)
- Incentives for contributors
- Access rules
- Heterogenous European ethical and legal landscape
- Data protection in biobanking
- Sustainable funding
- Improving quality

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BBMRI
Biobanking and Biomolecular Resources Research Infrastructure

Managing resources for the future of biomedical research

- Home
- News & Events
- Proposals & Calls
- About BBMRI
- Workpackages
- Partners & Membership
- Publications & Reports
- Stakeholder's Forum
- Press
- FAQ
- Links
- Contacts
- Member Area

- Catalog of European Biobanks
- WIKI Legal Platform

Catalog of European Biobanks

www.bbmriportal.eu

The catalogue is intended to be used as a reference for scientists seeking information about biological samples and data suitable for their research. The work has been performed in close collaboration with P3G-project (www.p3g.org) to avoid overlapping work and also repeated contacts towards the biobanks.

VISITOR LOGIN:

Username: guest

Password: catalogue

The BBMRI catalogue of European Biobanks provides a high-level description of Europe's biobanks characteristics using a portal solution managing metadata and aggregate data of biobanks. The catalogue can be queried by country, by biobank, by ICD-groups, by specimen types, by specific strengths, by funding and more. A search function is available for all data.

Flash tutorial

Please click here to see the flash tutorial of the overview catalogue demonstrating the main functions. You will need Adobe Flash Player (http://get.adobe.com/flashplayer/) in order to view the content of this window.

Contact for for population-based biobanks:

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Expected Impact of BBMRI

- BBMRI should provide a pan-European framework to foster excellence in biomedical research
- Better projects, faster, cheaper
- Access to high quality resources, technologies, services, education and training
- Partner for academia and industry
- SMEs: Strategic partner, customer
- Pharma: Biomarker and drug development
- Incubator for regional development
- Start-up packages

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Impact of Biobanking

- Biobanks are the foundation of several rapidly expanding domains of biological/medical sciences:
- Molecular pathology (developing molecular-based classification and diagnosis procedures for diseases)
- Molecular and genetic epidemiology (assess the genetic and environmental basis of diseases in general population and families)
- Pharmacogenomics/Pharmacoproteomics (understanding the correlation between and individual patient's genotype/ phenotype and response to drug treatment)
- Personalized Medicine (identification of risk factors and drug sensitivity)
- Health systems (evaluate diagnosis, treatment and outcome in populations)
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- **Improving prospects for prevention and better health.**

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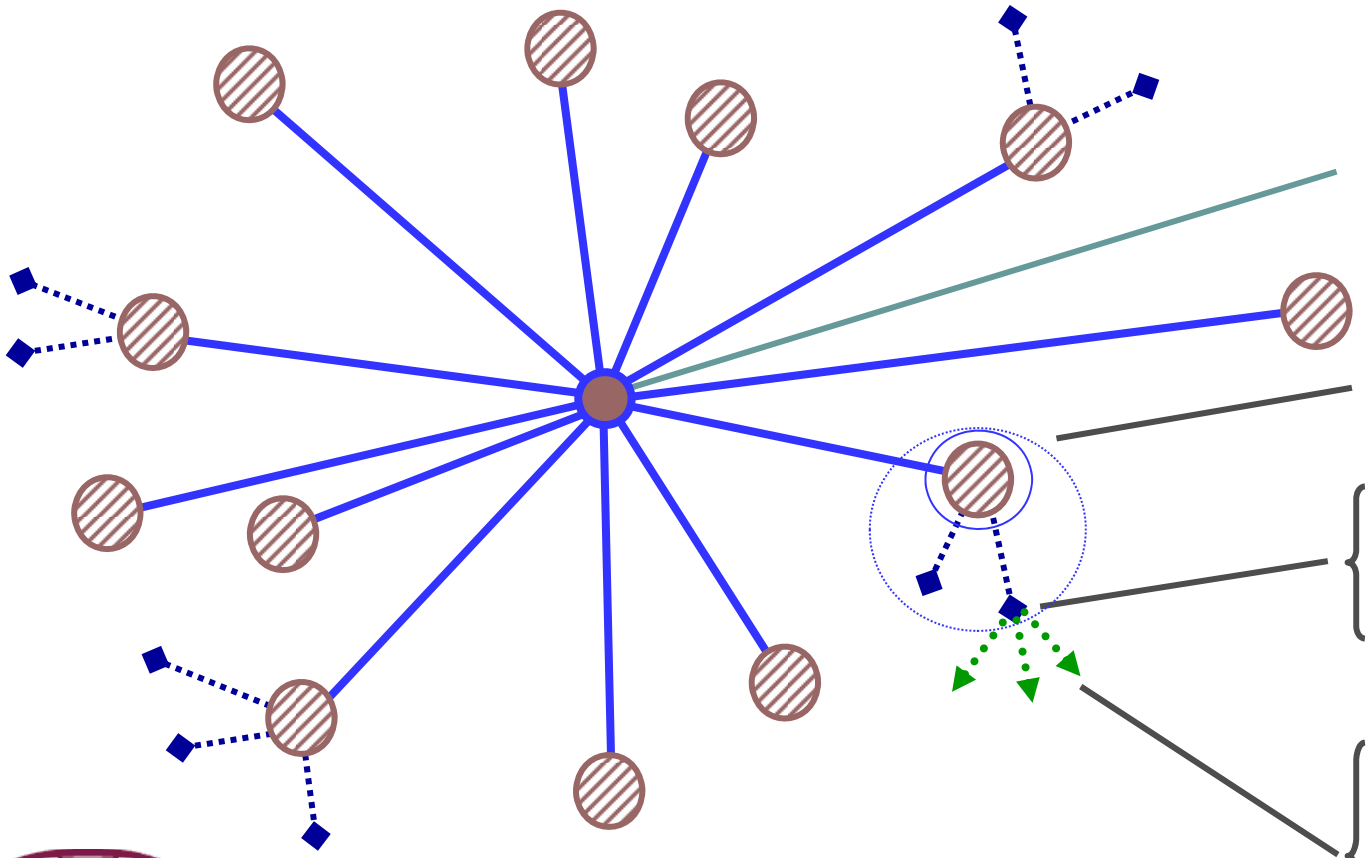
Legal Structure of BBMRI (ERIC)

Distributed hub and spoke structure



Secretariat
(statutory seat)

National members

Biobanks
Biomolecular res.
Technology centers

Associated partners
Hospitals
Universities
Service providers ...

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Benefits for Citizen and Regional Development

- Promotion of public health
- Reduction in the burden of complex and rare diseases
- Speed-up the development of personalised medicine
- Contribution to reduce some of the bottlenecks in drug discovery and development
- Promotion of participation of underdeveloped regions by adoption of the ERIC legal framework, specific education and training programmes and start-up packages

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Epidemiology must evolve

The priority for the future of epidemiology, the basic population science, must be a focus on several key areas;

- Finding effective ways to implement what is currently known in order to reduce the incidence and mortality of disease;
- Researching efficient methods of reducing disease disparities in all global settings;
- Establishing a clear focus on prevention in order to improve healthy life expectancy.

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Global Health Challenge
Could Premature Deaths be Halved?

- As an example of the new approach to Epidemiology, the challenge of halving premature deaths could be undertaken.
- Premature death could be considered as death before old age i.e. death at ages up to 69.
- The potential of this challenge must be addressed separately in the age groups 0-4, 5-34 and 35-69.

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Can current vascular and cancer death rates in middle age (35-69) be halved?

There are approximately 130 million births each year worldwide.

At year 2000 death rates, 20 million will die before middle age; 40 million will die in middle age (35-69) of which 15 million deaths will be from Vascular Disease and 10 million from Cancer.

If premature deaths are to be halved, then this reduction will only come about if deaths from vascular disease and cancer can be halved.

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Halving Cancer and Vascular mortality rates in middle age (35-69)

Halving Cancer and Vascular Mortality will come from primary and secondary prevention;

Control of Hypertension and hyperlipidaemia are key to prevention cardiovascular mortality;

Key lifestyle risk factors notably Tobacco Smoking, physical inactivity, obesity, type of dietary fat consumed and extreme alcoholism are all relevant to primary and secondary prevention.

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How important is blood pressure to vascular death?

A 20 mmHg reduction in systolic Blood Pressure halves vascular mortality at age 35-69

Prospective Studies Collaboration (60 studies, 1M adults, 0.1M deaths) Lancet 2002; 360: 1903

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Premature Death is Largely Avoidable

Death is inevitable: premature death (0-69) is largely avoidable.

99% of deaths in children can be avoided by cheap and effective medication (e.g. vaccination against measles) and public health measures (e.g. clean water and sanitation).

More than half of the world's deaths in middle age can be prevented by steps to prevent cancer (vaccination and lifestyle changes such as elimination of cigarette smoking) and cardiovascular disease (control hypertension, blood lipids and lifestyle changes).

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Thought for the Day

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