



MAPPING NCD

A PRESENTATION OF PROJECT FINDINGS

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Introduction

NCD aims to map current Non-Communicable Disease (NCD) R&D funding and research impact in Europe with a view to improving the returns on investment in NCD research. In particular, updated mapping information on the impact of NCD initiatives and research has the potential to identify overlaps, synergies, gaps and also opportunities for policy learning, exchange and collaboration across the EU.

OBJECTIVES

1. Identify current EU-funded, as well as national, regional and charitable research programs and initiatives in the field of chronic non-communicable diseases.
2. Map the scale and scope of research activities in this area, including the research fields addressed and their implementation modalities.
3. Provide adequate comparison of data and results through the use of common definition criteria and methodology.
4. Analyze their funding sources and map the impact of overall investments and outputs to date.
5. Identify potential overlaps, synergies, gaps and opportunities for future collaboration.
6. Contribute to the development of evidence-based policies towards supporting coordinated approaches in chronic non-communicable diseases research.

METHODOLOGY

MAPPING_NCD comprises a detailed qualitative survey of each of the five identified disease areas, a bibliometric analysis and an impact assessment. Accordingly, MAPPING_NCD collects primary and secondary data via qualitative and quantitative research techniques.

For the surveys, the collection of primary data involved the conduct of surveys with key governmental and non-governmental funding organizations, together with key clinical and scientific researchers for the purpose of identifying outputs, financial resources committed, overlaps, synergies, gaps and opportunities for collaboration regarding NCD research activities, outputs and implementation. The collection of secondary data involved the review of reports, published research from academic journals and grey material derived from websites. Primary bibliometric data was involved in the analysis of published academic research on NCDs for the purpose of deriving data regarding the funding sources, overall investments and output of NCD research activities. Papers identified for bibliometric analysis were downloaded and classified according to the International Disease Classification (ICD-10).





EU FUNDED RESEARCH

Within European funding schemes, FP-6 projects have been addressing all relevant CVD diseases, except for ischaemic heart disease. This changed under FP-7 where substantial concentration effects towards cerebrovascular, ischaemic heart disease and heart failure could be observed.

WP 2: Cardiovascular Diseases (CVDs)

CHALLENGE TO PUBLIC HEALTH

CVDs are the main cause of mortality in the European Union, causing 1.92 million deaths (39 %) in the region in 2010. This has slightly decreased in the last years (caused mortality in 1990: 47%), resulting in eight countries containing CVD mortality below cancer related mortality in men in 2013.

SCALE OF INVESTMENT ACTIVITIES¹

The UK has been by far the largest funder of cardiovascular research in Europe with almost 1 bn EUR spent within the last years. Assuming levels of spending to correlate with levels of GDP, it comes as a surprise to see Switzerland and Netherlands being the second and third position in terms of money invested in CVD research. Other countries, such as Germany or France, have a higher GDP, but spent less money on CVD research in absolute terms.

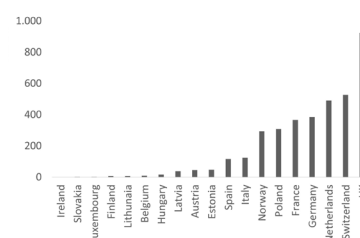
PRIVATE SECTOR INVESTMENTS²

In Europe, private pharmaceutical companies demonstrate a limited commitment to investment in CVD research. From the top 10 European pharmaceutical companies, 8 companies are currently active in the development of New Molecular Entities (NMEs) for CVDs, but the overall share of R&D investments devoted to CVD research is less than 10%. In terms of medical devices (MDs), we identified 319 that were either newly approved or at the clinical assessment stage between 2011 and 2015. Five different companies produce these devices. While less than 20 out of 319 MDs focus on the treatment of cerebrovascular diseases, around 120 devices focus on treating other forms of heart diseases such as arrhythmia or atrial fibrillation.

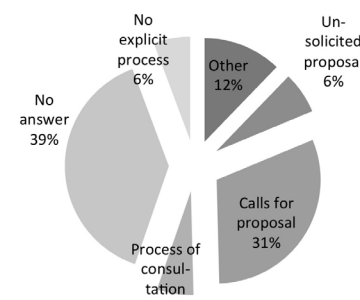
SAMPLE SIZE AND DATA PROVISION

We identified 132 Research Funding Organizations (RFOs) for CVDs across the European area and obtained qualitative information for 124 and quantitative data from 81 RFOs.

1 National Investments 2008-2013



Processes for Making Investments





PUBLISHED PAPERS³

In terms of research output, some European countries are doing better than others. For example, Germany has the highest absolute research output in terms of published papers in the area of CVDs, which is not surprising taking its high levels of GDP spend on research into account. At the same time, France has produced significantly less output than the UK, although they have similar levels of GDP. This might be partially explained by the strong CVD research funding landscape in the UK with influential players such as the British Heart Foundation. Discrepancies between relative wealth and research output can also be found by comparing other countries such as Italy and the Netherlands. Although the Netherlands has about half the GDP of Italy, it still managed to publish more papers between 2002 and 2013.

FUTURE NEEDS

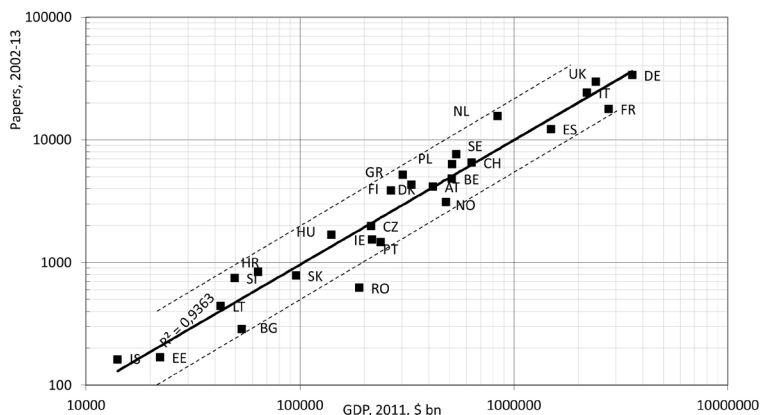
Reliable and solid database for monitoring CVD prevalence in Europe: The current available databases offer a tool for preliminary analysis on CVD mortality and prevalence in Europe. However, the persistent regional variance of CVD mortality in the European Union cannot be fully explained by variations in risk factors, capacities for early risk detection or health system efficiency in member states. E.g. fluctuations in hypertensive diseases in Eastern European countries, or under representative CHD prevalence in France has been subject to extensive research and

revealed practices of wrong coding patterns (so called “garbage coding”) and national biases towards coding CVD categories.

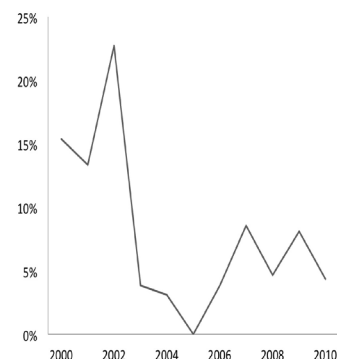
Raising awareness for potential of CVD risk management targets: Risk factors have been researched in plentiful detail and professional guidelines offer a prominent platform promoting CVD prevention. The potential of CVDs risk management is not fully exploited because clinicians may not find the time for comprehensive and regular risk detection screenings for coronary patients as prescribed by the European Society of Cardiology (ESC) guidelines. High CVD risk patients may need further professional help as CVDs rehabilitation therapy to break with behavioral patterns.

Heart Failure: The prevalence of „congestive heart failure“, which is a result of several other CVD, is increasing and can only be treated to a limited extend to avoid the high probability of mortality. This includes a reduction in fluid intake and drug therapy - with a clear research need for developing new therapeutic approaches to the strengthen the heart muscle.

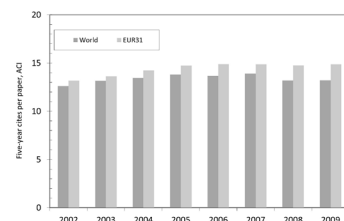
3 Papers against GDP



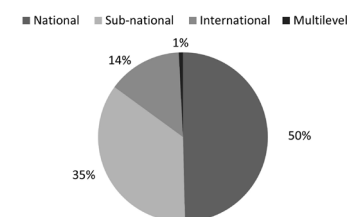
2 % of CVD-related NMEs



3 Five year cites per paper



RFOs Area Activity Level





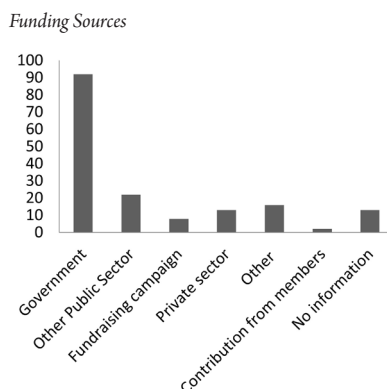
WP 3: Chronic Respiratory Disease (CRD)

CRDs are, today, the fifth leading cause of lost disability-adjusted life years (DALYs) both worldwide and across Europe. For some time chronic obstructive pulmonary disease (COPD) and CRDs in general have remained relatively unknown to both governments and the public. Even today, there are very few RFOs exclusively concerned with CRD research. The WHO has attempted to establish a comprehensive worldwide approach to the surveillance, diagnosis, prevention and control of CRDs with the formation of the Global Alliance against Chronic Respiratory Diseases (GARD), a voluntary alliance of organizations, institutions and agencies for the purpose of improving global lung health and increasing wider public awareness about the threat and debilitating effects of CRDs

Central Europe (notably Netherlands, Germany, Switzerland) has allocated the highest amount of funding to CRD research with a total expenditure of

more than €1.21 bn for the period 2008-2013. Northern Europe is second largest funder of CRD research with overall expenditure of around €258 mn for the same period. Both, the Central and the Northern European contributions tower over the Southern and Eastern European contributions. The Northern European area has made steady increases in CRD funding over the period 2008-2013. By contrast Southern and Eastern areas have held levels of investment relatively steady. CRD research funding experienced a constant rise between 2008 and 2013, with an increase of 14% between 2008-2009 followed by a dramatic rise of over 100% almost between 2012-2013.

We identified and surveyed 131 RFOs active in the disease area. Of these 131, the survey response rate was 40%. By supplementing survey responses and non-responses with website queries, we were able to extract satisfactory quantitative data from 78 RFOs.





3 INVESTMENT IMPACTS

Of surveyed RFOs, most considered academic publication as the major tool by which to capture the actual impact of their research investment. Only 23 RFOs indicated that establishment of a new policy or program was a means for measuring the impact of funding investments. Given that most RFOs engaged in funding CRD research are public sector organizations, one might reasonably expect that promoting policy change or initiating new health programs would be an effective measure of the impact of their investments.

PUBLISHED PAPERS ⁴

In terms of publications, the representation for major CRD areas is very unequal, with asthma representing over 40% of the total, and bronchiectasis barely 1%. Despite being the major category in terms disease burden, COPD measures about 24%. The UK has the highest output, more than twice as high as the second country, France, which is publishing almost twice as much as expected given their relative wealth. Similarly, Sweden and the Netherlands are also publishing about twice as much as expected. On the other hand, Austria is publishing very little, and Germany, Norway and Switzerland are doing barely half of what might be expected from their wealth.

PRACTICAL POLICY INITIATIVES

Higher Emission Standards; High quality generic pharmaceuticals; Standardized Management of CRDs; Stricter Tobacco Controls

RESEARCH FUNDING NEEDS

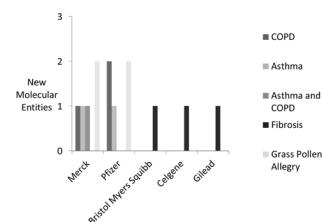
Modelling and Projections of Disease Burden: Building a solid evidence base for global health policies and programs is about building sophisticated models for extracting information and comparing the magnitude of the burden of various diseases and injuries.

Triggers for Asthma: There is a need for research that links improvements in health status with improvements to outdoor air quality, particularly with regard to the incidence of CRDs like childhood asthma

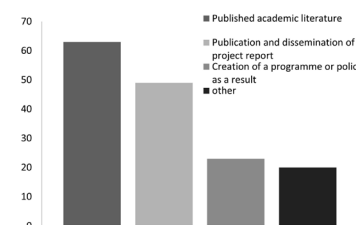
Interaction of Risk Factors for COPD: The development of successful preventive strategies for COPD demands a better understanding of non-traditional risk factors

Regulatory Controls for Tobacco: Scientists need to work with the organizations like the WHO and the tobacco industry to assess whether self-regulatory approaches are sufficient to reduce marketing and smoking take-up and whether and which additional regulatory mechanisms are necessary

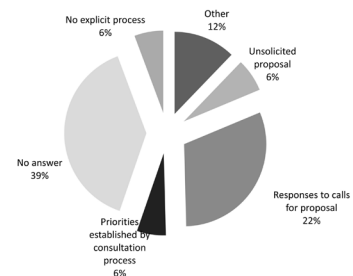
2 Pharma Research Pipelines



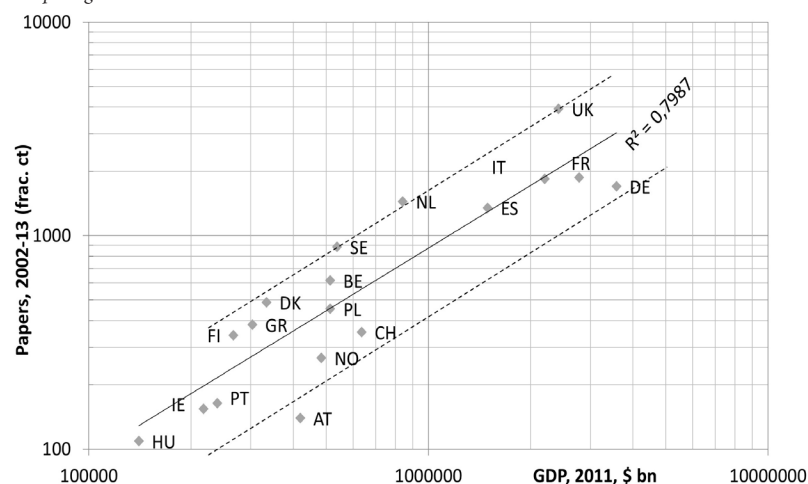
3 Measuring Research Investments

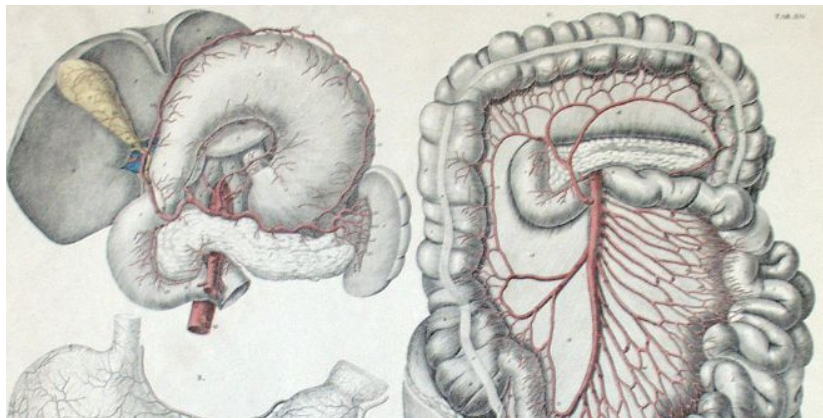


Processes for Making Investments



4 Papers against GDP





nies worldwide are currently involved in the production of innovative diabetes medical devices.

When focusing on pharmaceutical pipelines for diabetes US companies lose their leader role. They have overall less molecules relevant for diabetes in their pipelines than EU companies (26 molecules under development to 40). The majority of molecules developed by US and EU top pharmaceutical firms are aimed at treating type 1 and type 2 diabetes mellitus, while only few companies have developed molecules for the treatment of diabetes complications such as diabetic retinopathy, neuropathy and macular oedema.

WP 4: Diabetes

CHALLENGE TO PUBLIC HEALTH

Diabetes mellitus (DM) is a chronic disease characterized by prolonged high sugar levels in the blood. The prevalence is about 9% of the adult population worldwide. It has been estimated that, in the European Region, this condition accounts for 11% of all deaths in the age 20-79 years. According to the Global Burden of Disease Study (GBD), diabetes is the fourth leading cause of lost DALYs across Europe in terms of NCDs. Unlike other NCDs, the trend has increased over the last decades and projections show it will be even more burdensome in the future, due to population-ageing. In the long-term, increased blood or plasma glucose levels lead to serious microvascular and macrovascular complications, causing significant disability among the affected population

SCALE OF RFO INVESTMENT ACTIVITIES¹

The great majority of diabetes investments are concentrated on Northern and Central European areas, while Southern and Eastern Europe display

a significantly lower amount of funding on the disease. Analyzing the expenditure trend by European areas for the period 2002-2013 we observe that Southern European countries have maintained approximately the same level of diabetes investments during the whole period considered, while the other areas registered an important increase in funding until 2009, and a sudden decrease after this year.

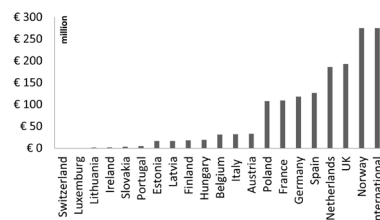
RFO SAMPLE SIZE AND DATA PROVISION

We identified 120 RFOs in 20 countries investing in diabetes research in Europe. The survey response rate was approximately 40% for all the RFOs. Few of the RFOs surveyed were devoted exclusively to Diabetes, with a majority of 88% investing in other NCD areas.

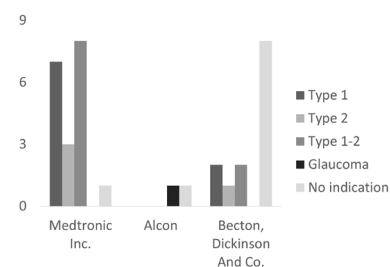
PRIVATE SECTOR INVESTMENTS

Diabetes is still receiving low attention by the Medical Device industry: Only three out of the top 16 compa-

1 National Investments (2002-2013)



Medical Device Industry





FUNDING LEVEL

Public sector RFOs dominate diabetes research funding and half of the RFOs financing diabetes research operate at a national level, while 33% of RFOs make investments at subnational or regional level. Only a small fraction of RFOs (13%) conducts their funding activities at international or mixed level, suggesting that RFOs involved in diabetes funding are more responsive to research needs within the belonging country rather than to international diabetes programs.

PUBLISHED PAPERS²

Despite having the lowest percentage disease burden from diabetes, the UK publishes the most papers of any of the EUR31 countries. There is a tendency for the northern European countries, especially Estonia and Finland, to devote relatively more effort to Type 1 diabetes, and for the southern European countries to fund Type 2 diabetes. The Scandinavian countries on the whole under-research the complications of diabetes. Its effects on the liver are relatively under-researched by several other countries, notably the UK and Ireland, the Czech Republic and several other east European countries except for Latvia and Romania.

PRACTICAL POLICY INITIATIVES

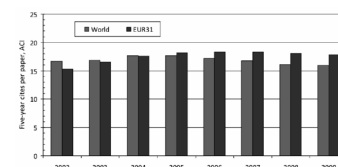
Higher focus on diabetes prevention and food labelling; better accessibility to the best care for diabetic patients; more funding for research conducting organizations.

RESEARCH FUNDING NEEDS

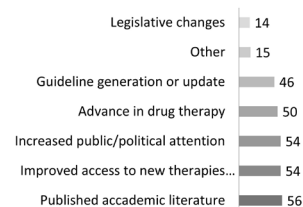
Interviewed stakeholders recognized the importance of looking beyond academic publications, beyond "scientific excellence" to promote impact on delivery of services and patient health outcomes. This approach involves a relatively higher consideration of translational or implementation research and highlights the importance of general public involvement in all stages of research.

In terms of infrastructures, the development of biobanks was the most recommended suggestion to speed up genetic-based studies. Another probably unexpected topic suggested for future research was on the social and health related quality of life aspects of people living with the disease, how it is possible to make patients and families more engaged with the treatment and how to get them to use the treatment more effectively.

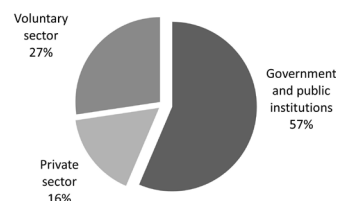
2 Five year cites per paper



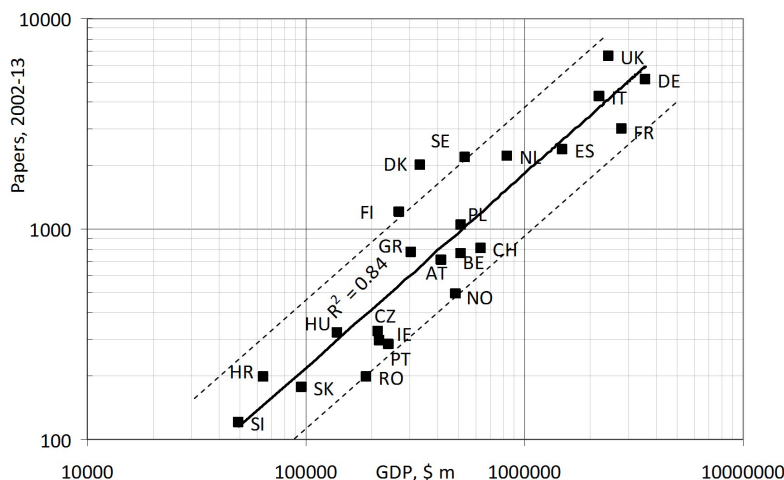
Expected Impacts



Partnership Types



2 Papers against GDP





PRIVATE SECTOR INVESTMENTS²

Overall, the European pharmaceutical sector has increased its commitment to R&D over the past four years. Half of the last four years European pharmaceutical research pipeline was done for oncology-related drugs. Compared with the US, major US companies have significantly less cancer molecules in their research pipelines than European based companies (116vs53).

WP 5: Cancer

CHALLENGE TO PUBLIC HEALTH

Europe comprises only one eighth of the total world population but has around one quarter of the global burden of cancer—3.45 million new cases per year, which costs the European economy more than 50 billion € in care, treatment, and lost productivity. More than 15% of that cost is due to smoking-induced lung cancer.

SCALE OF RFO INVESTMENT ACTIVITIES¹

The funding figures for Europe are substantial, with over a billion € per annum (from the year 2008 onwards, mainly). The total amount of funding over the study period (2002-2013) reaches 11.4 billion € for the EU-28. When considering Europe overall (31 countries), the total spending allocated to cancer research is of 14.3 billion €.

Central Europe's contribution to the overall investment in cancer research is considerable (6.6 billion € the entire study period), if compared to other European areas, although Northern Europe had a steadily increased spending for cancer research over the last 5 years. Currently funded Cancer

research projects have an average life span of about 37 months. The funding allocated for the majority of the selected projects (68%) was under 3 million €, whereas for a relatively smaller number of projects (16%) the funding allocated reached 5 million €.

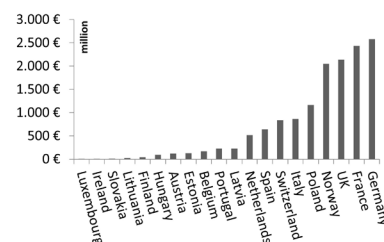
RFO SAMPLE SIZE AND DATA PROVISION

We identified and surveyed 169 RFOs active in the disease area. The survey response rate was 55%. Many of these RFOs were also active funders of NCD research in other disease areas (n=91). By supplementing non-responses with website queries, we were able to include 108 RFOs in the quantitative analysis.

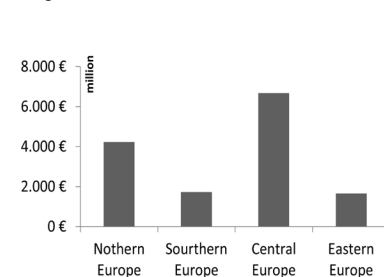
FUNDING SOURCES

Cancer research receives funding from the public sector mainly in Eastern (100% of total funding) and Southern Europe (55% of total funding), whereas in Central and Northern Europe there are other sources of cancer research funding (e.g. fundraising campaigns, contributions by members and others)

1 National Investments 2002-2013



1 Regional Investments 2002-2013





RESEARCH FUNDING NEEDS

Increase funds available for cancer research. It is not only a matter of more or less resources, but it is also related to the need of reducing the administrative burden of procedures for applying for cancer research funding.

PUBLISHED PAPERS ³

By comparison with the other NCDs, published research for Cancer shows a significant European presence, among the top three with an average of 38% of paper published, behind respiratory (56%) and cardiovascular disease (42%) and followed by 40% for Diabetes and 35% for mental disease. In terms of individual European countries, there are big differences in output, with more than three orders of magnitude between the largest (Germany) and the smallest (Malta). However, some of the smaller countries are expanding their output rapidly – notably Romania, whose fractional count output rose from only 7 papers in 2002 to over 250 in 2013.

Within the area of Cancer, the impact of European research is defined first of all into 11 research types, generating different numbers of papers, with genetics giving the most (17%), followed by chemotherapy (10%), prognosis (10%) and surgery (9%). Second by 22 different cancer sites, with breast giving the most of cancer papers (10%), followed by colon/rectum (7%), leukaemia (6%) and lymphoma (5%).

Related to medical devices, very few companies had produced research outputs in terms of scientific papers. Novartis was responsible for the overwhelming majority of papers (65%) with Jansen Pharmaceutical claiming a 8% share, Johnson and Johnson 6% and Siemens 5%.

Promote networks and cooperation between researchers. There is the need of establishing networks of comprehensive cancer centres throughout Europe and encouraging cooperation between basic translational and clinical researchers.

Set cancer as national priority for research, with specially focus on independent research, personal cancer medicine, multinational research infrastructures and observational studies.

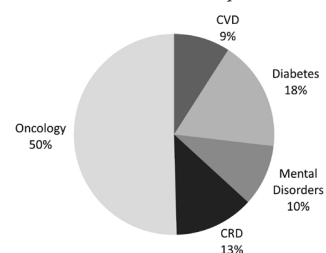
PRACTICAL POLICY INITIATIVES

Better communication between cancer research organizations;

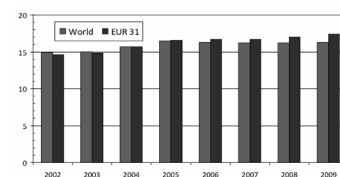
Less bureaucracy in terms of cancer research;

A shift from regional or national efforts to continent-wide collaborations.

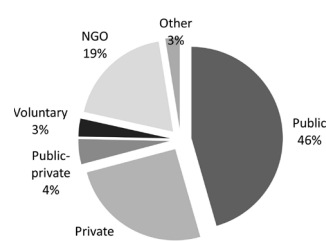
2 Pharmaceutical Research Pipelines



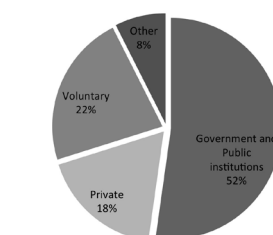
3 Paper Output

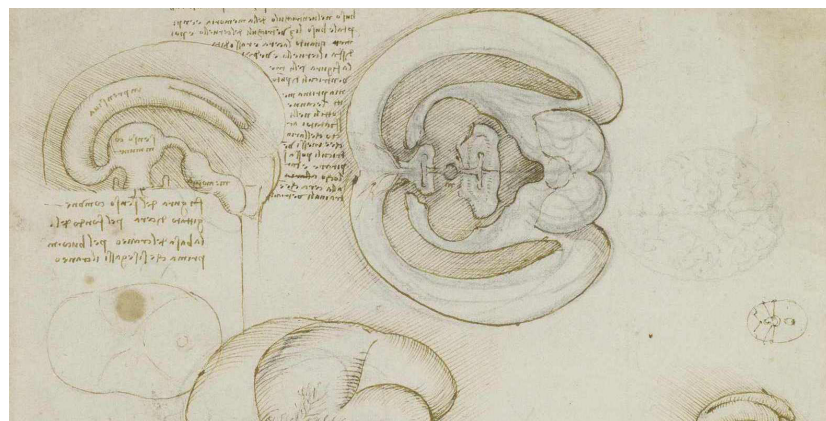


RFO Organization Types



RFO Partnership Types





WP 6: Mental Health Diseases (MHDs)

CHALLENGE TO PUBLIC HEALTH

Creating a comprehensive picture of the disease burden of Mental Health Diseases (MHDs) is difficult given their complex nature and high co-morbidity.

However, from 1990 to 2013, prevalence of MHDs has increased, sometimes dramatically: e.g. Alzheimer's disease and other dementias (+86%), schizophrenia (+52%) and anxiety disorders (+42%). Increases in MHD prevalence can be attributed to aging populations, improvements in diagnostic tools, better classification criteria, increased awareness and improved epidemiological studies.

SCALE OF RFO INVESTMENT ACTIVITIES¹

The most complete financial data from our dataset is for the year 2013, with 60 RFOs providing funding data for that year. The investment level for just over half exceeded €500 000, averaging €17 million.

The research investment levels of

RFOs also varied among the four European regions. While RFOs investing over €500 000 per year comprised the greatest share in Central, Northern and Eastern Europe, the expenditure levels of RFOs in Southern Europe were largely under €100 000 annually. Our exploration of project-based funding in the five largest EU countries confirms this trend.

RFO SAMPLE SIZE AND DATA PROVISION

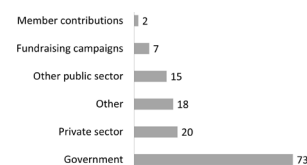
From the 137 RFOs identified as investing in MHD research in 20 countries, we gathered some qualitative data for 77% (n=105), and 60% (n=76) provided at least some quantitative data for the period 2008 to 2013. A baseline threshold of €0.1 million in overall investment was set in order to identify funding that could be expected to influence the content or direction of major research programs. However the annual funding level for a third of the RFOs that provided funding data was less than €100 000 and averaged €40 000

PRIVATE SECTOR INVESTMENTS

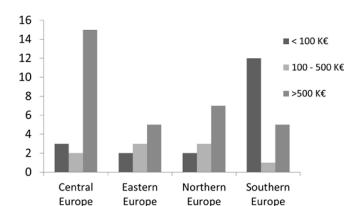
The level and extent of research and development (R&D) in drugs targeting MHDs has diminished in recent years, both in Europe and the US, due to the long, expensive and uncertain development process and the lack of identified treatment targets. An exception is Alzheimer's disease, where the largest pharmaceutical companies had ongoing development activities. Moreover, smaller pharmaceutical companies are active in MHDs, including MHDs that received low or no investment by the top 20 companies.

R&D investment in MHDs by medical device companies was not extensive, although recent innovations include different forms of transcranial stimulation. In addition, imaging devices are being used to identify treatment targets and for diagnostic purposes, with the development of tracers often undertaken by pharmaceutical companies. Other device innovations are being developed outside of the traditional medical device industry, including mHealth applications, which may provide expanded access and minimize issues of stigma.

Funding Sources



1 RFOs by funding thresholds





RESEARCH IMPACTS ²

MHD research output more than doubled between 2002 and 2013, and European MHD papers included in our study account for almost 6% of all biomedical research and 40% of MHD research worldwide. Depression, Alzheimer's disease and schizophrenia papers comprised 57% of the output for the years 2002-2013 among 10 MHDs. Some relatively high prevalence MHDs, including anxiety and alcohol abuse disorders, receive only a small share of research attention. Not surprisingly, smaller countries had higher levels of international collaboration, which Switzerland had in addition to its high research output.

FUTURE NEEDS

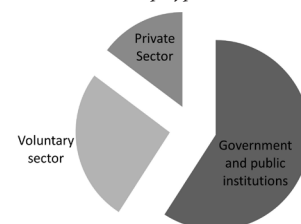
Facilitating cross-country collaboration in Europe: A number of bodies, platforms and programs have been put into place at the EU level to facilitate collaborative research. Nonetheless, the level of participation in research projects by smaller MSs remains low. The EC may wish to explore what barriers to broader participation may exist and how they may be addressed.

Broadening the scope of MHD research: Some important innovations in addressing the burden of MHDs are the result of research funded by

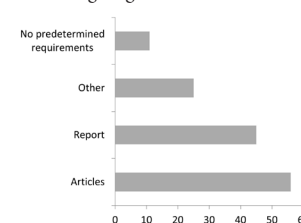
entities that may be seen as operating on the margins of the traditional medical research environment. With the withdrawal of larger pharmaceutical companies from investment in MHD research, smaller firms have taken on a larger role in MHD drug development, focusing on treatments for MHDs that have received less attention from larger firms. Most of the smallest pharmaceutical companies that we identified as having MHD drugs in their pipelines were based in the US. The EC should consider whether there are any measures that should be taken to encourage innovation by such firms in Europe, such as public support for later stage clinical research that may be too expensive for small firms.

Research priorities for larger RFOs: Research aimed at identification of biomarkers for diagnosis and risk stratification and the development of MHD treatments should be prioritized over symptomatic treatments.

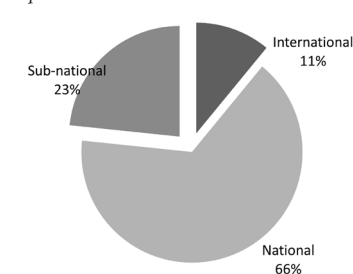
Favored Partnership Type



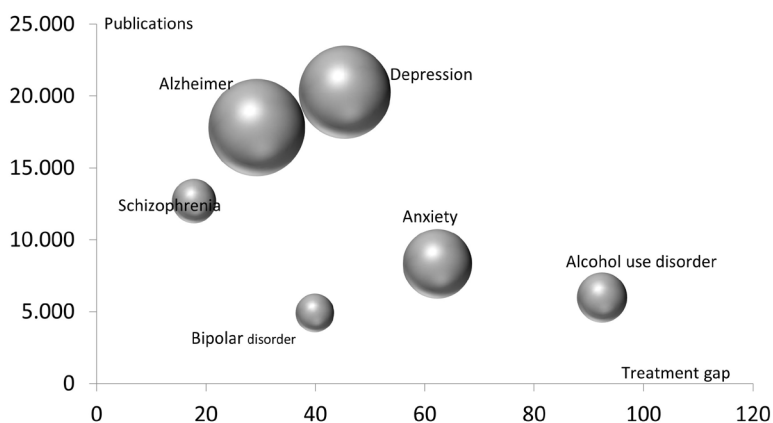
Monitoring Progress



Operational Level



2 Publications (2002-2013) against treatment gap (percentage of individuals who require care but do not receive treatment). Size of bubble reflects disease burden





Impressum:

The NCD project has received funding from the European Union Seventh Framework Program (FP7/2007-2013)



NCD “A Presentation of Project Findings”:

Concept and Idea: Victor Stephani

Layout: Pierre Kramann-Musculus

Figures belong to the consortium partners. The illustrations for the diseases are taken from drawings by da Vinci

