

Resource allocation to brain research in Switzerland

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Summary

Questions under study: This study represents a first attempt at estimating Swiss resource allocation to brain research including both public and private spending.

Methods: In order to estimate public spending (by governments and charities) a survey was conducted to evaluate the way brain research is funded across Europe and especially in Switzerland. Industry funding was measured using different approaches including a survey of pharmaceutical expenditures and the costs of developing new drugs.

Results: Private spending is at a reasonable level because a highly developed Swiss pharmaceutical industry invests significantly in this branch of science. However, public spending is at

a low level compared to other European countries, although Switzerland is the only European country where the total funding per capita exceeds that of US funding.

Conclusions: A detailed investigation of Swiss resource allocation to different branches of biomedical research is warranted. Brain research should be an important part of such a study. The United States and the European Union have selected brain research as one of their priority areas within health related research. The present figures indicate that this may also be justified in Switzerland.

Key words: funding; brain research; brain disorders; cost-benefit; Switzerland

Introduction

Brain research (neuroscience) provides a better understanding of normal human brain function. This has implications for every aspect of modern life and may improve human adaptation to modern society. Brain research is also crucial in order to better prevent, diagnose and treat brain diseases (neurological and psychiatric disorders). Brain diseases are prevalent and cause approximately one third of the total burden of all diseases [1]. The economic cost of brain diseases in Europe is more than € 386 billion [2] and probably equals the expense of cancer and heart diseases combined. The cost of brain diseases in Switzerland is about € 9 billion [3].

Given the importance of brain research, the

question arises as to whether this branch of research receives sufficient funding. To date, data on resource allocation to brain research have been almost totally lacking. Recently, the European Brain Council together with the research organization, European Health Economics (EHE), conducted a large European-wide survey describing the Resource Allocation to Brain Research in Europe (RABRE) [4]. The present report details data for Switzerland on the resource allocation to brain research. Public funding, defined as charity and government funding, and private funding, essentially meaning industry funding, were both included. We compare these data to those of other countries in Europe.

No financial support declared.

Methods

The RABRE study examined all known sources of funding, including governmental grants as well as charitable and industry funding. To estimate public spending (both by governments and charities), a survey was conducted that evaluated the way brain research is funded across Europe. Charitable organisations (organisations for public benefit that rely on donations for financial support) and private not-for-profit organisations (whose securities are not offered to the public) were combined into the term “charities” to avoid any confusion. By directly contacting the primary sources of research funding, the estimate represented the money spent by European institutions rather than the actual total research investments at European research institutions. The latter may include research funded from outside Europe, for example, the National Institutes of Health (NIH) in the US. The response rate of public agencies and an industry-funding estimate in Switzerland were sufficient. Imputations were made for countries with insufficient response rates to account for omitted data. Country and disorder specific spending is hence extrapolated from the data received and

should be treated with some caution. The national estimates were corrected for price level and inflated to 2005 values.

Industry funding was measured by three different approaches: (1) by using a worldwide survey of pharmaceutical expenditure according to disease area issued by the Centre for Medicines Research (CMR) [5]; (2) by considering the published cost of developing a new drug and applying that cost to the number of new chemical entities [NCE(s)] launched in Europe in the past decades [6]; and (3) by applying the share of drugs for brain diseases that have entered the market between 1985 and 2004 to total R&D (research and development) expenditure by pharmaceutical companies in Europe over the same period of time [7]. Disorder specific expenditures were estimated based on the share of brain disorder specific drugs that have entered the market. Country specific estimates were based on national pharmaceutical industry contribution to total R&D in Europe according to European Federation of Pharmaceutical Industries and Associations (EFPIA) [7].

Results

The total funding of brain research in Europe is shown in fig. 1.

The total funding of brain research in Europe was estimated at € 4.1 billion in 2005. Charities and Government contributed € 855 million. Industry funding was estimated at € 3.25 billion. With regard to Swiss funding, the public funding bodies asked and the funding bodies that have responded are listed in table 1.

The total public funding in Switzerland amounts to € 8.6 million. These figures are included in the European calculations, which show public spending for brain research in the different European countries (fig. 2).

It can be seen that Switzerland, among the wealthy European countries, is in the middle

Table 1

Public funding agencies included in the study and their reported donation (2005).

Organization	Funding type	Reported Spending
Association Alzheimer Suisse	Charity	yes
Centre for Technology and Innovation	Government Agency	yes
Schweizerische Multiple Sklerose Gesellschaft	Charity	yes
Schweizerische Parkinsonvereinigung	Charity	yes
Swiss Heart Foundation	Charity	yes
Swiss National Science Foundation	Government Agency	yes

Figure 1

Total funding of brain research by disorder in Europe (2005).

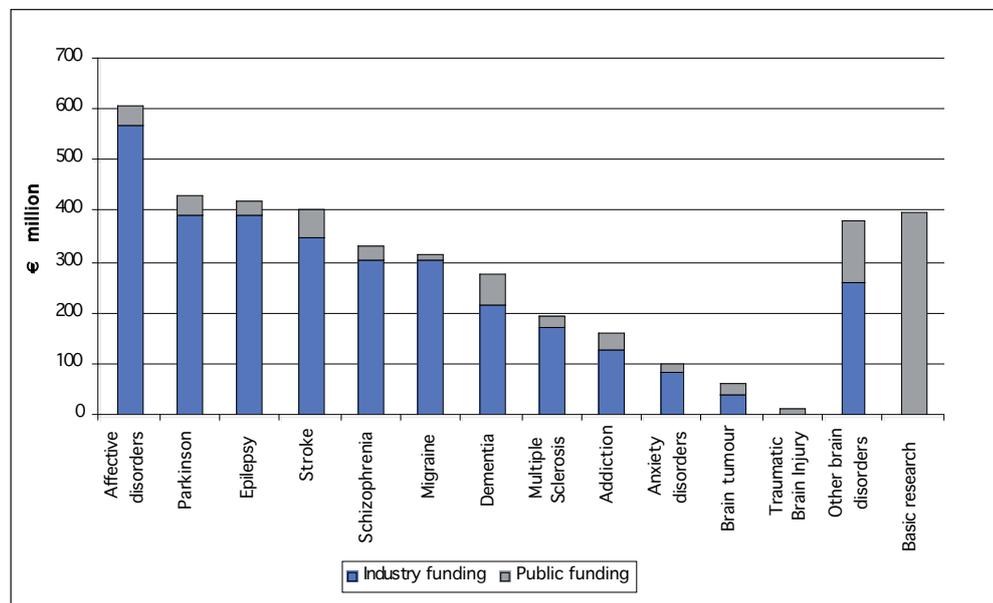


Figure 2

Public spending on brain research per country (2005).
* Reference countries for imputations

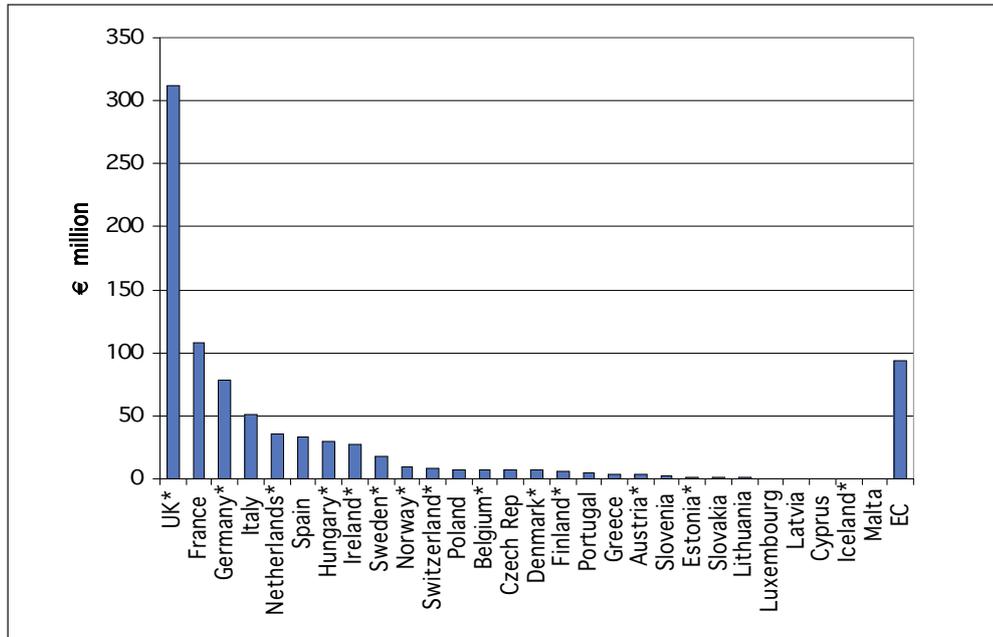
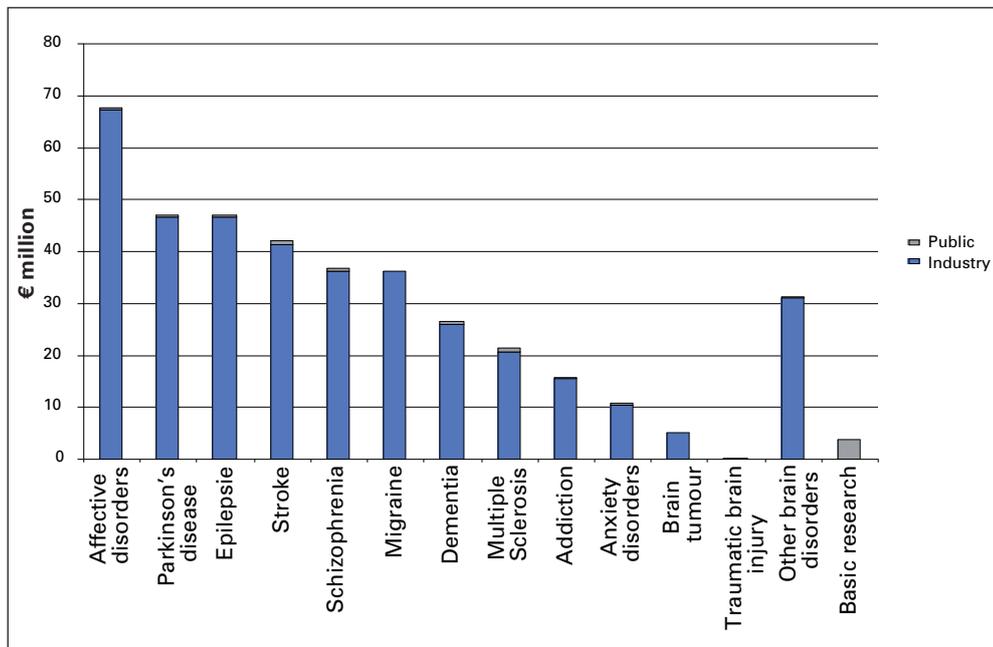


Figure 3

Public and industry research funding per disorder in Switzerland (2005).



range of public resource allocation to brain research and also in the middle range when population size is taken into account. Private funding in Switzerland was estimated to be more than € 383 million in the European study. The lowest estimate of funding in Switzerland is thus more than € 390 million per year with the possibility of an added 10% from biotech companies. Fig. 3 shows how Swiss brain research funding is distributed according to different disease groups and basic research.

It was not possible to obtain specific figures from universities on their spending on brain research and university spending is hence not included. European estimates [4, 8] indicate, however, that spending on brain research in institutions of higher learning in Switzerland is around € 12 million, virtually all of it for basic research. The distribution of public funding for disease related research versus basic research is likely to

be roughly equal. Within the different disease areas, the best funded diseases in Switzerland are affective disorders and the least funded is Traumatic Brain Injury (TBI). If this is related to the burden of the individual diseases (fig. 4), the relatively best funded disease is however Parkinson's disease at 24% of the costs and the relatively least funded disease is TBI (0.3%) and most of the mental disorders.

The Swiss funding of brain research is € 53 million per million inhabitants. The funding in the United States is € 49 million per million inhabitants [9], in Europe it is € 8.3 and in Denmark € 22 [12] (Fig.5). Switzerland is the only European country with a higher per capita research spending than the US, due to the large estimate of private funding in Switzerland. Regarding public funding for brain research, Ireland had the highest level per capita (€ 6.7), followed by the UK (€ 5.2) and Hungary (€ 2.7). The lowest levels

were found in Latvia (€ 0.14) and Malta (€ 0.15). Switzerland (€ 1.1) had a per capita spending shortly below the European average, estimated at

€ 1.2 [4]. The US per capita public spending is € 20.8.

Discussion

Resource allocation to different branches of research has so far not been based on careful weighting of the size of the problem and the possibilities for achievement. It has mostly been driven by the activity level within a particular branch of science in a particular country combined with certain political preferences. The Lisbon agreement of the EU related the necessary research spending to the gross national product and requested that by 2010 general research funding should be 3% of the gross national product with 2% private funding and 1% public funding [10]. Relating research expenditure to gross national product could also be expressed as a rela-

tion to gross national spending, which roughly has to equal the national product. A next step in this line of thinking is to compare research spending to the cost of the field of study. Brain research expenditure should thus be compared to the cost of brain diseases. However, the importance of understanding normal human brain function should also be taken into account. In contrast, research into other organs such as the heart or the kidney is mostly or exclusively important because of prevention and treatment of diseases related to those organs.

If one accepts the argument that research effort in a particular field should be related to its cost, then it becomes important to know the resources spent on different fields of research. However, very little work has been done in Switzerland or in other countries to elucidate this issue. The present study is to our best knowledge the first estimation of resource allocation to brain research in Switzerland and it is based on the first ever study of Research Allocation to Brain Research in Europe. Since the data brought here are derived from the European study, it is possible to compare Swiss figures to the figures of other European countries and also to the United States. Likewise, we can compare the Swiss spending to the data that are now available on the cost of diseases of the brain in Switzerland [3] and to the European figures for the burden of brain diseases based on WHO data [1]. Brain tumour and traumatic brain injury are relatively rare in comparison to other brain disorders, but very costly per case. Migraine and mental disorders are very prevalent and cause a heavy monetary burden to society. In this respect the present data show that especially research into mental disorders is dramatically under funded in Switzerland. A similar pattern emerges in Europe, as mental disorders taken together make up 69% of the total cost of brain disorders, whereas the brain research funding makes up about 35% [4].

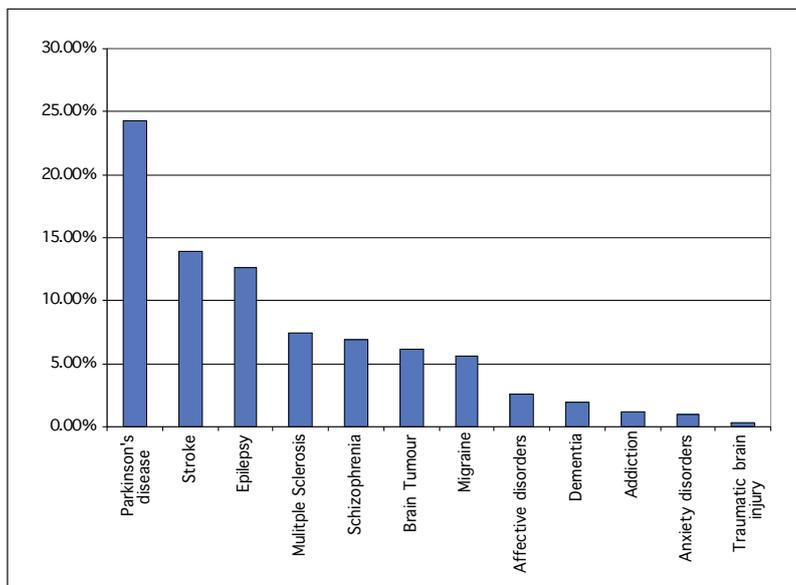


Figure 4
Brain research funding as percentage of costs in Switzerland (2005).

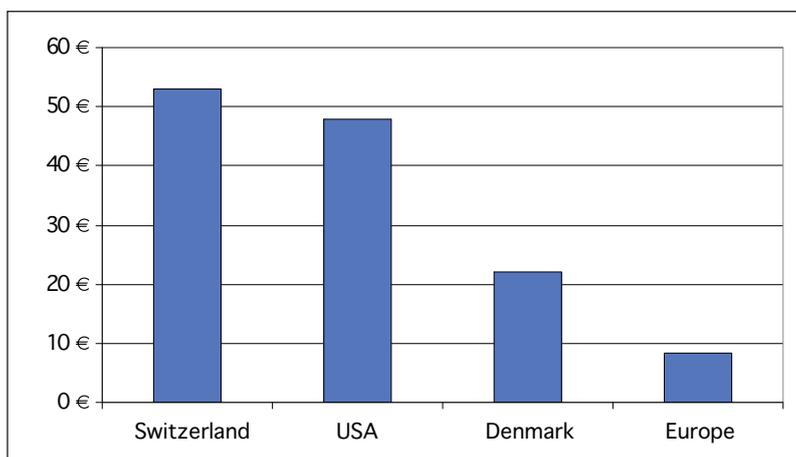


Figure 5
Brain research funding per capita for Switzerland, Europe, Denmark and US (2005).

Accuracy of the present data

Since this is a pioneering study it also has significant weaknesses. Not all funding bodies have been identified in our search and not all funding bodies responded. It is unlikely that major funding bodies were not identified, but a relatively large number of small foundations etc. may have remained undetected in the European survey. Other funding bodies have not been able to allocate their donations to different topics and hence were unable to give a figure for their donations to

brain research. A specific Swiss study based on similar methodology as the European study is warranted. Such a study would identify private and public spending more efficiently but would not be comparable to data from other countries. It would still be relatively uncertain because many funding bodies do not know to what extent they fund brain research as opposed to other kinds of research. In order to acquire really precise data, funding bodies will need to start recording which types of research they are funding in a systematic and uniform way. The biggest uncertainty in the present study, is that university funded brain research was not included. This was estimated from figures originating at Uppsala University in Sweden, and it is by no means certain that the estimate for Swiss university spending is precise.

Some of the uncertainties tend to overestimate, other to underestimate funding so that the total figure for research allocation to brain research is likely to be in the correct range. In the European study, sensitivity analysis was conducted and indicated that the results were probably correct within $\pm 25\%$. In the estimate of industry funding it is assumed that the share of CNS drugs marketed reflects the investments today, but since CNS drugs in pipeline are increasing, the correct figure is probably higher. In addition, the Swiss estimate is based on Switzerland's share of total R&D and it is assumed that this share also accounts for CNS but this might not be the case. The spending by these pharmaceutical companies is most likely spread over several countries, making it difficult to account for how much is Swiss

private funding. Even though the total estimate from the European study of industry funding in Europe is fairly accurate ($\pm 10\%$), there is great uncertainty when reduced to a national level.

Comparisons

The total estimate of resource allocation to brain research in Switzerland is € 392 million and the cost of brain disease in Switzerland has been estimated at € 9 billion [3]. Thus, research investment equals 4.4% of the costs. Of this 98% is private (industry) and 2% is public, divided into governmental 92% and charities 8%. In these calculations, the enormous importance of understanding normal brain function is not included. Whilst industry funding of brain research thus reaches the Lisbon goals of the EU, public funding and particularly government funding is very much lower than the Lisbon goals. Compared to the United States, Swiss public funding of brain research is low, as it is for most other branches of research, as the United States overall spends more of its gross national product on research than do the European countries [11]. As in many other countries, in Switzerland resource allocation follows outdated legal regulations and is not based on research needs, i.e. based on the prevalence, respectively the burden, of disorders. The course of brain disorders is often chronic and characterized by a high degree of disability thereby generating high indirect costs [13]. A new legal general framework that considers the burden of diseases is required.

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