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Development and Use of a Cancer Research Funding Database: Promoting Strategic Global Cancer Research Using the International Cancer Research Partnership Database

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Abstract

The International Cancer Research Partnership (ICRP) has developed a cancer research funding database since its establishment, with data gathered from the participating funnding organizations. We estimated and compared the total amount of cancer research funding from governmental organizations in the USA, the UK and Japan using ICRP and publicly available databases. We also discussed use of the ICRP database as a tool to consider the cancer research funding allocation at a national level.

Keywords:

Cancer research, Database, Government organizations

Introduction

Strategic cancer research funding is needed to maximize the impact of the funds at both national and global levels. The International Cancer Research Partnership (ICRP) was established in 2001 [1], and is an alliance of governmental and charitable organizations funding regional, national, and international cancer research grants and awards. There are 24 Partners, representing 129 cancer research funding organizations in 2018 from Australia, Belgium, Canada, Denmark, France, Hong Kong, Japan, the Netherlands, the United Kingdom, and the United States.

ICRP partners code their annual funding portfolios to a common format and submit the coded portfolios to a publicly-available database on the ICRP website (hereinafter, ICRP database). The ICRP database currently contains over 78,000 awards from 1990, and estimated roughly 60% of cancer research funding at global level.

The ICRP database contains a classification system, "Common Scientific Outline" (hereinafter, CSO) [2]. CSO was originally developed by the National Cancer Institute and the US Department of Defense to analyse cancer research funding comprehensively. The CSO has been used by ICRP and various funding agencies and countries to analyze and achieve appropriate allocation of cancer research funding.

The current version of the CSO (CSO v2) was adopted by the ICRP in April 2015 and all awards in the ICRP database are coded to this version. CSO v2 is organized into six broad areas of scientific interest in cancer research (Table 1) [1] .

Table 1– CSO codes [1]

CSO 1	Biology
CSO 2	Etiology
CSO 3	Prevention
CSO 4	Early Detection, Diagnosis, and Prognosis
CSO 5	Treatment
CSO 6	Cancer Control, Survivorship, and Outcomes Research

The ICRP database also contains a standard cancer type coding scheme. CSO and site coding lay a framework to improve coordination among research organizations, making it possible to compare and contrast the research portfolios of public, non-profit, and governmental research agencies.

ICRP publishes regular data reports using ICRP database, e.g., 2005-2008 benchmark analysis of cancer research funding, Disparities in cancer research, and Childhood cancer [1].

The governments fund a considerable amount of medical research to cancer care including biology, aetiology, prevention, treatment and public health [3]. Given that the total amount of money devoted to cancer research is limited, it is important to maximize allocation of cancer research funding as a part of national caner control programmes (NCCPs). As the ICRP database contains most of the cancer research funding from governmental organizations in some countries, such as the US and UK, it could be a useful tool to consider the cancer research funding allocation at national level.

The purpose of this study is to estimate and compare the total amount of cancer research funding from governmental organizations (hereinafter public cancer research funding) in the USA, the UK and Japan using ICRP database and publicly available databases, and to discuss effective use of the ICRP database as a part of national cancer control programmes.

Methods

We extracted data of public cancer research funding between 2011 and 2015 from the USA and the UK from the ICRP database.

As most of Japan's public cancer research grants data has not yet been included in the ICRP database, we extracted public cancer research grants data in Japan between 2011 and 2015 from publicly available databases of three ministries of Japan; namely the Ministry of Health, Labour and Welfare (MHLW), the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Economy, Trade and Industry (METI). We allocated at least one CSO and one site

code per grant. Grants with more than one CSO or site codes were divided equally by the number of CSO or site codes for the analyses. All Japanese grants were converted from Japanese Yen to US$ using the exchange rates of 1 JPY = US$ 0.0114.

We estimated the total amount of public research funding in the USA, the UK and Japan. We conducted a comparative analysis of public cancer research funding among the three countries, CSO and cancer site. All data was analyzed using SPSS ver. 25 (IBM, NYC).

Results

Annual public cancer research funding between 2001 and 2015 was estimated at US$ 4,407 – 5,814 million in the USA, US$ 289 – 324 million in the UK, and US$ 244 – 333 million in Japan.

Public cancer research funding was distributed primarily to "CSO5 Treatment" in all three countries, followed by "CSO1 Biology". The smallest proportion was estimated as "CSO3 Prevention" in the USA and Japan, and "CSO2 Etiology" in the UK (Table 2).

Table 2– Total Amount of Public Cancer Research Funding in the USA, UK and Japan in 2011-2015

		Total Amount (Million US$, [%])				
		2011	2012	2013	2014	2015
US	CSO1	1,274.3 (24.5%)	1,155.3 (24.6%)	977.5 (22.2%)	1,089.4 (23.3%)	1,477.1 (25.4%)
	CSO2	738.7 (14.2%)	630.5 (13.4%)	617.0 (14%)	623.7 (13.4%)	840.4 (14.5%)
	CSO3	424.8 (8.2%)	438.7 (9.3%)	440.5 (10%)	416.1 (8.9%)	469.3 (8.1%)
	CSO4	690.4 (13.3%)	640.9 (13.6%)	651.3 (14.8%)	659.2 (14.1%)	775.3 (13.3%)
	CSO5	1,426.6 (27.4%)	1,269.1 (27%)	1,222.2 (27.7%)	1,376.4 (29.5%)	1,661.7 (28.6%)
	CSO6	646.1 (12.4%)	569.0 (12.1%)	498.8 (11.3%)	502.6 (10.8%)	590.4 (10.2%)
	Total	5,200.9 (100%)	4,703.5 (100%)	4,407.3 (100%)	4,667.3 (100%)	5,814.1 (100%)
UK	CSO1	73.8 (25.6%)	62.9 (20.8%)	60.2 (20.8%)	64.4 (21.5%)	60.0 (18.5%)
	CSO2	21.5 (7.4%)	14.7 (4.9%)	11.5 (4.0%)	13.7 (4.6%)	17.6 (5.4%)
	CSO3	22.8 (7.9%)	28.8 (9.5%)	26.8 (9.3%)	27.1 (9.0%)	29.1 (9.0%)
	CSO4	45.9 (15.9%)	51.9 (17.2%)	51.4 (17.8%)	51.9 (17.3%)	56.4 (17.4%)
	CSO5	91.9 (31.8%)	106.6 (35.3%)	101.9 (35.3%)	104.1 (34.7%)	122.1 (37.7%)
	CSO6	32.7 (11.3%)	37.6 (12.4%)	37.2 (12.9%)	38.8 (12.9%)	39.0 (12%)
	Total	288.6 (100%)	302.4 (100%)	289.1 (100%)	300.1 (100%)	324.2 (100%)
JP	CSO1	56.7 (21.9%)	63.6 (23.5%)	59.8 (24.5%)	50.6 (13.1%)	70.6 (21.2%)
	CSO2	23.7 (9.1%)	24.2 (8.9%)	24.9 (10.2%)	36.3 (9.4%)	31.1 (9.4%)
	CSO3	9.7 (3.8%)	12.3 (4.5%)	9.2 (3.8%)	7.8 (2.0%)	4.8 (1.4%)
	CSO4	40.1 (15.5%)	31.8 (11.7%)	31.9 (13.1%)	54.6 (14.1%)	61.8 (18.6%)
	CSO5	100.1 (38.7%)	112.2 (41.4%)	97.1 (39.8%)	213.1 (55.2%)	144.6 (43.5%)
	CSO6	28.7 (11.1%)	26.9 (9.9%)	21.1 (8.7%)	24.0 (6.2%)	19.6 (5.9%)
	Total	258.9 (100%)	271.0 (100%)	243.9 (100%)	386.3 (100%)	332.5 (100%)

Among the cancer sites evaluated, "Not Site-Specific Cancer" received the highest amount of funding in the three countries. There were differences in the allocation of public cancer research funding per cancer site among the three countries. In the past 5 years, breast cancer, prostate cancer and lung cancer were funded as the top three cancer sites in the USA, while leukemia, breast cancer, colon and rectal cancer, and prostate cancer in the UK, and lung cancer, colon and rectal cancer, leukaemia and liver cancer in Japan. The differences may be partly explained by the cancer mortality and incidence of each country.

Table 3– Top Three Publicly Funded Cancer Research by Cancer Site in the USA, UK and Japan in 2011-2015

		2011	2012	2013	2014	2015
US	1	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer
	2	Breast Cancer	Breast Cancer	Breast Cancer	Breast Cancer	Breast Cancer
	3	Prostate Cancer	Prostate Cancer	Lung Cancer	Lung Cancer	Lung Cancer
UK	1	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer
	2	Leukemia	Breast Cancer	Breast Cancer	Breast Cancer	Prostate Cancer
	3	Breast Cancer	Leukemia	Colon and Rectal Cancer	Prostate Cancer	Breast Cancer
JP	1	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer	Not Site-Specific Cancer
	2	Lung Cancer	Lung Cancer	Lung Cancer	Liver Cancer	Lung Cancer
	3	Colon and Rectal Cancer	Leukemia	Liver Cancer	Lung Cancer	Leukemia

Conclusions

This study indicated that public cancer research funding can be analysed using the ICRP database. The USA, the UK and Japan have common features of public cancer research funding in general, i.e., relatively higher investments in treatment and biology (CSO), and breast cancer (cancer sites). However, some differences have been revealed from our analysis particularly in the allocation of cancer research funding by cancer sites.

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