Promoting strategic global cancer research using the International Cancer Research Partnership’s tools for evaluation, collaboration, and trends in research funding

2 October 2018

Lynne Davies, DPhil
Operations Manager
International Cancer Research Partnership

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Session Number: T5-4
Promoting strategic global cancer research using the ICRP’s tools for evaluation, collaboration, and trends in research funding
Congress track 5 – Raising funds and attracting resources

Disclosure of interest:
• Abstract previously published / presented: No
• Affiliated organisation: International Cancer Research Partnership
Session structure

• Brief introduction to ICRP and ten year overview of trends in cancer research funding
  (Lynne Davies, ICRP)

• ICRP Mapping Platform – a tool for mapping global cancer research and collaboration
  (Kalina Duncan, National Cancer Institute - USA)

• Experience as an ICRP Partner using CSO data for international comparison of funding trends and to inform investment decisions
  (Toshio Ogawa, International University of Health and Welfare - Japan)

• Questions and discussion time
ICRP mission – what we do

ICRP’s mission is to **add value** to cancer research efforts internationally by fostering **collaboration** and **strategic co-ordination** between cancer research organizations.

Active, international network of 129 cancer research funding organizations

**Trusted network**

- Online research portfolio on ICRP website
- Data/information sharing on research evaluation and outputs
- Analytical tools for data analyses
  - Individual partner analysis
  - National and international analysis
- Forum for identifying scientific areas for research and collaborations
Our current partners

Representing multiple organizations:

- 21 largest UK organizations, incl. CRUK, MRC
- NCI and cancer research from 25 other NIH institutes
- 42 Canadian cancer organizations, incl. CIHR, Canadian Cancer Society
- 22 Childhood cancer organizations
ICRP Website and Database

Comprehensive structured search functionality. Users can search by year, organization, city, country, CSO, cancer type, keyword, project type, PI Name....

Public site:
- basic project information to enable researchers to find collaborators, avoid duplication

Partner site:
- Enhanced analysis tools
- Access to funding data per project

New in 2018: ICRP mapping interface

https://www.icrpartnership.org/db_search
Structured data – ICRP Classifications

Cancer type:
- 47 cancer site codes (breast, prostate etc.) linked to ICD-10

Automated coding tools
Available for partners

https://www.icrpartnership.org/CSO
ICRP Website and Database

ICRP Website*

Global cancer research database

Forum area for exchange of news, ideas, requests for collaboration

Evaluation framework: links to resources for evaluating output and impact

Project & collaborator map

*Generously supported by the US National Cancer Institute and Congressionally-Directed Medical Research Programs
Understanding the cancer research landscape

ICRP publishes regular data reports
- 2005-2008 benchmark analysis of cancer research funding
- Obesity & cancer (2014)
- Environmental influences on breast cancer (2014)
- Metastatic breast cancer (2014)
- Translational research methodology (2015)
- Lung cancer (2016)
- Disparities in cancer research (2016)
- Childhood cancer (2016)

Publications due in 2018
- 10 year trend analysis of international cancer research

ICRP data also contributes to topic-specific reports led by ICRP or partner organizations

https://www.icrpartnership.org/library
Trends in cancer research investment

ICRP Data

ICRP 10 year trend analysis

Identify collaborators

Track funding over time

Identify research gaps

Intelligence for the cancer research community
- Strategic Planning
- Address gaps
- Opportunities to collaborate
What’s included in ICRP

Research projects and initiatives included

- Includes research costs
- Excludes operational or building investment and cancer implementation research

Data normalization
- Non-US currencies converted to USD
- Projects active in calendar year (start/end dates)

Database estimated to include >60% of global cancer research funding

Publication output as proxy indicator
[https://incites.thomsonreuters.com](https://incites.thomsonreuters.com)
- Around 56% of non-pharma publications due to ICRP members

Estimates from published annual/financial reports
- Around 65% of investment due to ICRP members
- *We welcome new members!*
Overview of trends

ICRP analysis 2005 – 2015

Organizations have
• Increased investment in real terms
• New organizations have been formed to research cancer
CSO – Type of research

Changes in 2015

- Percent changes suggest a more translational focus (diagnostics, treatment)
- Trends similar, but more marked ICRP’s 2005-2008 analysis
- Takes time to shift portfolio patterns…

Peaks in 2009-2011:
US government
American Recovery and
Reinvestment Act
funding
Cancer investment vs. mortality

Trends

- Cancers with high mortality receive higher proportion of funding - investment targeted at tumours with highest burden
- Outliers: lung, stomach, leukaemia, brain (similar to incidence comparison, not shown) but also liver/stomach
- Success stories: pancreatic and brain cancer funding increased significantly in terms of percentage

Mortality data source: GLOBOCAN 2012 ([http://gco.iarc.fr/today](http://gco.iarc.fr/today))

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Funders are responding to unmet research needs

Example: Pancreatic cancer

- Increase in funding, especially CSO1, CSO4, CSO5
- Trend towards increased percentage of portfolio
- Private foundations providing increasing proportion of funds (Hendifar et al., [https://www.ncbi.nlm.nih.gov/pubmed/28259790](https://www.ncbi.nlm.nih.gov/pubmed/28259790))
- 16 new institutions worldwide researching pancreatic cancer in 2015
Capacity for deep analysis

Detailed classifications

- Understand areas of increased activity – e.g., biology, biomarker discovery, systemic therapy discovery and testing
- Identify barriers to research, e.g., lack of model systems

More detail in our forthcoming publication…
Full report – due late 2018

• Make information in the ICRP database available to cancer research organizations. Infographic & aggregate data pack on public website

**Context for organizational strategy**

• Invite more organizations to submit their data to the ICRP database and complete the picture of world cancer research funding – we will issue regular updates from 2019 onwards

**Complete picture of international cancer research**

• Highlight case studies: showing how analyses of organizational, national or international research investment have changed strategy

From analysis…

- Environmental influences on breast cancer analysis
- Declining $ and # projects

- UK Prevention analysis 2002
- Low % of portfolio (2%)

To action…

- Additional research funding calls and $ Partner action: CBCRP

- Multi-partner action: UK NPRI
Open invitation

Join ICRP to help complete the picture of international research
• All organizations funding cancer research are welcome to join the partnership. Our partners include large funders addressing all areas of cancer research, and small organizations targeting specific research areas

Annual meeting
• Find out more at our free annual meeting – guests are welcome
• April 2019, Atlanta USA – just after AACR
ICRP Mapping Platform – a tool for mapping global cancer research and collaboration

2 October 2018
Kalina Duncan, MPH
Center for Global Health
US National Cancer Institute

www.icrpartnership.org

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What is the ICRP Map?

- An interactive geospatial map, mapping all projects in the ICRP database
- Users can “drill into” the map from Region > Country > City > Institution
- Users can search in the ICRP database and view matching projects on Map
- Users can view all project collaborators on a “Project Funding People Map”
- Users can use the map layers feature to overlay epidemiologic data on Map

Partners with Collaborator Data:
- NCI
- CCRA
- NCRI (coming soon)
Drill through the ICRP Map from Region to Institution
ICRP Mapping Platform – a tool for mapping global cancer research and collaboration
Kalina Duncan

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ICRP Mapping Platform – a tool for mapping global cancer research and collaboration

Kalina Duncan

Switch between ICRP Map and ICRP Database

Search Terms

- Enter search terms
- All of the keywords
- None of the keywords
- Any of the keywords
- Exact phrase provided

Year Active

- All Years Selected

Use this indicator to search for awards that are active during the time period you have selected.

Project Award Code

- Award Code

Institutions and Investigators

Funding Organizations

Cancer and Project Type

Common Scientific Outline - Research Area

Search / Reset / Clear

Search Criteria: Institution + City + Country(ies) + Region(s)

- Institution: International Agency for Research on Cancer
- City: Lyon
- Country(ies): FR
- Region(s): Europe & Central Asia

Total Base Projects: 78 / Total Projects: 128

Search Criteria:

Projects by PI Country

Projects by CSO

Projects by Cancer Type

Projects by Type

View ICRP Map

<table>
<thead>
<tr>
<th>Project Title</th>
<th>PI</th>
<th>Institution</th>
<th>Ctry.</th>
<th>Funding Org.</th>
<th>Award Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A comprehensive investigation into the...</td>
<td>Johansson, Matt...</td>
<td>International Agency For Research On Cancer</td>
<td>FR</td>
<td>WCRF UK</td>
<td>2014/1193</td>
</tr>
<tr>
<td>A genomewide study of lung cancer in n...</td>
<td>Gorlova, Olga</td>
<td>Dartmouth College</td>
<td>US</td>
<td>NCI</td>
<td>CA149462</td>
</tr>
<tr>
<td>A new approach to identify rare genetic...</td>
<td>Lesueur, Fabienne</td>
<td>International Agency For Research On Cancer</td>
<td>FR</td>
<td>NCI</td>
<td>CA156624</td>
</tr>
</tbody>
</table>
View project-level collaborators
ICRP Mapping Platform – a tool for mapping global cancer research and collaboration
Kalina Duncan

View project-level collaborators

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Institution</th>
<th>Region</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gorlova, Olga</td>
<td>Principal Investigator</td>
<td>Dartmouth College</td>
<td>North America</td>
<td>Hanover, NH, US</td>
</tr>
<tr>
<td>Rennert, Gad</td>
<td>Collaborator</td>
<td>Carmel Medical Center</td>
<td>Middle East &amp; North Africa</td>
<td>Haifa, IL</td>
</tr>
<tr>
<td>Stucker, Isabelle</td>
<td>Collaborator</td>
<td>French Institute of Health and Medical Research (INSERM)</td>
<td>Europe &amp; Central Asia</td>
<td>Paris, FR</td>
</tr>
<tr>
<td>Risch, Angela</td>
<td>Collaborator</td>
<td>German Cancer Research Center (HZ)</td>
<td>Europe &amp; Central Asia</td>
<td>Heidelberg, DE</td>
</tr>
<tr>
<td>Wichmann, Erich</td>
<td>Collaborator</td>
<td>Helmholtz Zentrum München (HZ)</td>
<td>Europe &amp; Central Asia</td>
<td>Munich, DE</td>
</tr>
<tr>
<td>Houlston, Richard</td>
<td>Collaborator</td>
<td>Institute of Cancer Research</td>
<td>Europe &amp; Central Asia</td>
<td>London, ENG, UK</td>
</tr>
<tr>
<td>Boffetta, Paolo</td>
<td>Collaborator</td>
<td>International Agency For Research On Cancer</td>
<td>Europe &amp; Central Asia</td>
<td>Lyon, FR</td>
</tr>
<tr>
<td>Bonassi, Stefano</td>
<td>Collaborator</td>
<td>Istituto Nazionale dei Tumori (IRCCS)</td>
<td>Europe &amp; Central Asia</td>
<td>Milan, IT</td>
</tr>
<tr>
<td>Hung, Rayjean</td>
<td>Collaborator</td>
<td>Mount Sinai Hospital &amp; Lunenfeld-Tanenbaum Research Institute</td>
<td>North America</td>
<td>Toronto, ON, CA</td>
</tr>
<tr>
<td>Haugen, Aage</td>
<td>Collaborator</td>
<td>National Institute of Occupational Health</td>
<td>Europe &amp; Central Asia</td>
<td>Oslo, NO</td>
</tr>
<tr>
<td>Kiemeny, Lambartus</td>
<td>Collaborator</td>
<td>Radboud University Nijmegen</td>
<td>Europe &amp; Central Asia</td>
<td>Nijmegen, NL</td>
</tr>
<tr>
<td>Field, John</td>
<td>Collaborator</td>
<td>University of Liverpool</td>
<td>Europe &amp; Central Asia</td>
<td>Liverpool, ENG, UK</td>
</tr>
<tr>
<td>Barros-Dios, Juan</td>
<td>Collaborator</td>
<td>University of Santiago de Compostela</td>
<td>Europe &amp; Central Asia</td>
<td>Santiago de Compostela, ES</td>
</tr>
</tbody>
</table>
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Overlay Map Layers

Layers you can select:
- Cancer Incidence (10 cancers)
- Cancer Mortality (10 cancers)
- All-Cancer Prevalence
- World Bank Income Bands
Hypothetical scenario: Your organization is thinking about a new funding initiative in breast cancer. They want to know if any other funding organizations are funding research in breast cancer, and where this research is being conducted.

Some questions they have given you:
- Where is breast cancer research currently being conducted?
- Who is funding this research?
- What does this breast cancer research portfolio look like in terms of CSO codes?
How can the ICRP Map help in planning for future funding initiatives?

Where is breast cancer research currently being conducted?

We’re particularly interested in breast cancer research around South East Asia, so we’d like to drill further.
How can the ICRP Map help in planning for future funding initiatives?

Where is breast cancer research currently being conducted?

The Map is showing few breast cancer projects in East Asia, but it is unlikely that no breast cancer research is being conducted in SE Asia – adding projects from local funders would help give a more accurate picture of research in the region.
How can the ICRP Map help in planning for future funding initiatives?

Who is funding breast cancer research? ● Which institutions are doing this research?

Pie chart shows funding organizations
Institutions view shows institutions with matching research projects
How can the ICRP Map help in planning for future funding initiatives?

What kinds of breast cancer research are being performed?

Projects by CSO

<table>
<thead>
<tr>
<th>CSO Category</th>
<th>% Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>21.61</td>
</tr>
<tr>
<td>Cancer Control, Survivorship and Outcomes Research</td>
<td>15.17</td>
</tr>
<tr>
<td>Treatment</td>
<td>14.87</td>
</tr>
<tr>
<td>Early Detection, Diagnosis, and Prognosis</td>
<td>11.62</td>
</tr>
<tr>
<td>Causes of Cancer/Etiology</td>
<td>9.06</td>
</tr>
<tr>
<td>Prevention</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Download charts from ICRP to see CSO project distribution.
Lessons Learned:
• ICRP Database and Map can be used to identify relevant projects, funders, and institutions working on research that may be relevant to your future funding initiative
• Results would be more powerful with additional funder datasets, particularly from SE Asia

Value of Adding SE Asia Funder Data:
• Locally funded SE Asia projects would be featured in the ICRP Database, Map
• ICRP funders could collaborate with local SE Asia funders on future funding initiatives
• SE Asia funders could find local institutions, researchers to collaborate with via the ICRP Map
Experience as an ICRP Partner using CSO Data for International Comparison of Funding Trends and to Support Investment Decisions

Toshio Ogawa¹, Tomotaka Sobue², Yuri Kitamura², Seiichiro Yamamoto³, Teruhiko Yoshida⁴, Yasuhiro Fujiwara⁵

1. International University of Health Welfare Graduate School
2. Dept. Social and Environmental Medicine, Osaka Univ., School of Medicine
3. Center for Public Health Sciences, National Cancer Center
4. Center for Research Administration and Support, National Cancer Center
5. Strategic Planning Bureau, National Cancer Center and National Cancer Center Hospital

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Background and aim

- Cancer is the leading cause of death in Japan.
- The government funds a considerable amount of cancer research.
- In Japan, most of the cancer research are funded by the government whereas not only government but also charities are providing certain proportion of cancer research funding in the US and UK.

- Although a substantial amount of public funds are allocated to the cancer research in Japan, there is few studies analysed public cancer research funding.
- Also there has been little output/outcome analyses about the public cancer research funding.

- The purpose of this research is to estimate total amount of public cancer research funding in Japan and to compare the allocation of Japan’s cancer research funding with those in the US and in the UK.
Method: 2011 Analysis

- Extracted Japan’s grant data in 2011 from the following publicly available databases:
  - MHLW (Ministry of Health, Labour and Welfare) Grant:
    - Grants of the 3rd-term Comprehensive Strategy of Cancer Control from MHLW Health Labour Sciences Research Grant (National Institute of Public Health of Japan)
    - NCC Research and Development Fund, funded in 2011 (National Cancer Research Centre)
  - MEXT (Ministry of Education, Culture, Sports, Science and Technology) Grant:
    - Cancer-related researches of Grant-in-Aid for Scientific Research of MEXT (KAKEN Database of Grants-in-Aid for Scientific Research, National Institute of Informatics)
    - "Health and Labour Sciences Research Grants for Research on Applying Health Technology (Cancer Research Area)" were excluded from the analysis.
  - METI (Ministry of Economy, Trade and Industry) Grant:
    - Cancer-related researches from METI websites
- Constructed a public cancer research fund database using the extracted data
  - CSO and site coding for all extracted data
    - Double-blinded
- Conduct descriptive analyses in Japan and comparative analyses between Japan, US and UK by a multidisciplinary team of investigators.
Method: 2011 Analysis

- Extracted number of death data in three countries in 2011
  - Japan: NCC website
  - US: CDC website
  - UK: Cancer Research UK website

- Analyse correlation using Spearman’s correlation analysis between cancer death and cancer research funding by cancer sites.
Method: 2011-15 Analysis

- Expanded the public cancer research database, added 2012 - 2015 data extracted from the ministries:
  - MHLW (Ministry of Health, Labour and Welfare)
  - MEXT (Ministry of Education, Culture, Sports, Science and Technology)
- CSO and site coding for all extracted data
  - Double-blinded
  - Automated coding by UberResearch (with Google translate)
- Extracted US and UK data from ICRP database
  - Selected grants from government
- Conduct comparative analysis between Japan, US and UK in 2011-15
Results: 2011 Analysis

- Public cancer research funding was estimated at approximately US$5,618 million in the US whereas US$243 million in the UK and US$294 million in Japan.
- In the UK, total amount of cancer research funding was estimated at US$764 million (public: US$ 243m + non-public: US$ 521m), larger than the Japan’s funding. More than half of it were funded by various charities.
- Average amount of public cancer research funding per grant was estimated that Japan is the smallest among 3 countries.

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>US</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. population (000)</td>
<td>127,799.0</td>
<td>311,582.6</td>
<td>63,258.9</td>
</tr>
<tr>
<td>Total public cancer research funding (000 USD)</td>
<td>294,434.8</td>
<td>5,617,639.9</td>
<td>243,122.7</td>
</tr>
<tr>
<td>Number of grant (n)</td>
<td>3,668.0</td>
<td>18,427.0</td>
<td>2,840.0</td>
</tr>
<tr>
<td>Average amount per grant (000 USD)</td>
<td>80.3</td>
<td>304.9</td>
<td>85.6</td>
</tr>
<tr>
<td>Average amount per capita (USD)</td>
<td>2.30</td>
<td>18.03</td>
<td>3.84</td>
</tr>
</tbody>
</table>
Public cancer research funding was distributed primarily to “CSO1 Biology” and “CSO5 Treatment” in all three countries.

Large differences between average amount per grant per CSOs in the US and UK
- “CSO3 Prevention” in the US and “CSO5 Treatment” in the UK were estimated as more than two times larger than the others
- There were small differences in average amounts of funding between CSOs in Japan.

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>US</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total amount (000 USD)</td>
<td>Proportion of amount (%)</td>
<td>Average per grant (000 USD)</td>
</tr>
<tr>
<td>CSO1</td>
<td>76,639.9</td>
<td>26.0%</td>
<td>71.9</td>
</tr>
<tr>
<td>CSO2</td>
<td>32,777.1</td>
<td>11.1%</td>
<td>69.0</td>
</tr>
<tr>
<td>CSO3</td>
<td>8,437.1</td>
<td>2.9%</td>
<td>88.8</td>
</tr>
<tr>
<td>CSO4</td>
<td>47,571.0</td>
<td>16.2%</td>
<td>84.4</td>
</tr>
<tr>
<td>CSO5</td>
<td>104,283.7</td>
<td>35.4%</td>
<td>90.4</td>
</tr>
<tr>
<td>CSO6</td>
<td>24,725.8</td>
<td>8.4%</td>
<td>78.5</td>
</tr>
<tr>
<td>Total</td>
<td>294,434.8</td>
<td>100.0%</td>
<td>80.3</td>
</tr>
</tbody>
</table>
Some common cancer sites that were allocated larger amount of public cancer research funding in three countries, i.e., Breast cancer, Colon and Rectal Cancer and Leukaemia.

Liver Cancer, Pancreatic Cancer and Oral Cavity and Lip Cancer only appeared in Japan in the top ten cancer sites allocated.

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>Total amount (000 USD)</th>
<th>number of grant (n)</th>
<th>Cancer site</th>
<th>Total amount (000 USD)</th>
<th>number of grant (n)</th>
<th>Cancer site</th>
<th>Total amount (000 USD)</th>
<th>number of grant (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Not Site-Specific Cancer</td>
<td>104,138.4</td>
<td>737.6</td>
<td>2  Breast Cancer</td>
<td>2,279,793.7</td>
<td>3,384.6</td>
<td>Not Site-Specific Cancer</td>
<td>158,132.8</td>
<td>1,648.7</td>
</tr>
<tr>
<td>2  Lung Cancer</td>
<td>23,078.2</td>
<td>274.6</td>
<td>3  Prostate Cancer</td>
<td>816,579.7</td>
<td>5,610.2</td>
<td>Colon and Rectal Cancer</td>
<td>11,384.0</td>
<td>188.7</td>
</tr>
<tr>
<td>3  Liver Cancer</td>
<td>17,944.5</td>
<td>201.2</td>
<td>4  Colon and Rectal Cancer</td>
<td>373,756.4</td>
<td>2,819.0</td>
<td>Breast Cancer</td>
<td>9,155.2</td>
<td>152.7</td>
</tr>
<tr>
<td>4  Breast Cancer</td>
<td>17,843.2</td>
<td>197.0</td>
<td>5  Lung Cancer</td>
<td>316,933.7</td>
<td>859.8</td>
<td>Leukemia / Leukaemia</td>
<td>8,462.7</td>
<td>98.6</td>
</tr>
<tr>
<td>5  Pancreatic Cancer</td>
<td>15,813.5</td>
<td>157.1</td>
<td>6  Colon and Rectal Cancer</td>
<td>280,994.1</td>
<td>728.8</td>
<td>Ovarian Cancer</td>
<td>8,121.7</td>
<td>40.8</td>
</tr>
<tr>
<td>6  Colon and Rectal Cancer</td>
<td>14,006.6</td>
<td>209.2</td>
<td>7  Leukemia / Leukaemia</td>
<td>261,874.7</td>
<td>783.6</td>
<td>Prostate Cancer</td>
<td>5,883.0</td>
<td>78.8</td>
</tr>
<tr>
<td>7  Leukemia / Leukaemia</td>
<td>12,414.5</td>
<td>202.8</td>
<td>8  Brain Tumor</td>
<td>185,268.8</td>
<td>620.1</td>
<td>Endometrial Cancer</td>
<td>3,933.2</td>
<td>8.8</td>
</tr>
<tr>
<td>8  Prostate Cancer</td>
<td>11,154.0</td>
<td>135.0</td>
<td>9  Non-Hodgkin’s Lymphoma</td>
<td>134,171.6</td>
<td>385.2</td>
<td>Esophageal / Oesophageal</td>
<td>3,686.3</td>
<td>54.4</td>
</tr>
<tr>
<td>9  Stomach Cancer</td>
<td>10,639.8</td>
<td>163.5</td>
<td>10 Ovarian Cancer</td>
<td>124,755.1</td>
<td>524.4</td>
<td>Kidney Cancer</td>
<td>3,086.2</td>
<td>22.1</td>
</tr>
<tr>
<td>10 Oral Cavity and Lip Cancer</td>
<td>5,793.2</td>
<td>212.8</td>
<td>11 Melanoma</td>
<td>123,194.1</td>
<td>331.1</td>
<td>Cervical Cancer</td>
<td>2,929.4</td>
<td>39.8</td>
</tr>
</tbody>
</table>
Results: 2011 Analysis

The proportion of public cancer research funding between CSOs for Breast Cancer and Colon and Rectal Cancer was different among three countries.

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total amount (000 USD)</td>
<td>Proportion of amount (%)</td>
<td>Average per grant (000 USD)</td>
<td>Total amount (000 USD)</td>
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<td>Total amount (000 USD)</td>
<td>Proportion of amount (%)</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>CSO1</td>
<td>1,783.6</td>
<td>10.0%</td>
<td>36.4</td>
<td>216,925.8</td>
<td>28.6%</td>
<td>94.7</td>
<td>1,518.6</td>
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<tr>
<td></td>
<td>CSO2</td>
<td>650.1</td>
<td>3.6%</td>
<td>31.7</td>
<td>115,283.2</td>
<td>14.1%</td>
<td>177.5</td>
<td>1,136.6</td>
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<tr>
<td></td>
<td>CSO3</td>
<td>144.4</td>
<td>0.8%</td>
<td>88.8</td>
<td>35,553.0</td>
<td>4.4%</td>
<td>223.7</td>
<td>1,317.7</td>
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<tr>
<td></td>
<td>CSO4</td>
<td>7,004.7</td>
<td>38.3%</td>
<td>175.7</td>
<td>134,666.9</td>
<td>16.5%</td>
<td>157.2</td>
<td>2,322.9</td>
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<tr>
<td></td>
<td>CSO5</td>
<td>7,224.3</td>
<td>40.5%</td>
<td>132.0</td>
<td>199,348.7</td>
<td>24.4%</td>
<td>170.8</td>
<td>2,225.5</td>
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<tr>
<td></td>
<td>CSO6</td>
<td>1,536.0</td>
<td>51.8%</td>
<td>33.2</td>
<td>114,602.7</td>
<td>14.1%</td>
<td>246.7</td>
<td>632.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>17,543.2</td>
<td>100.0%</td>
<td>90.6</td>
<td>816,579.7</td>
<td>100.0%</td>
<td>145.6</td>
<td>9,155.2</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Colon and Rectal Cancer</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Japan</td>
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<td></td>
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<td>Total amount (000 USD)</td>
<td>Proportion of amount (%)</td>
</tr>
<tr>
<td></td>
<td>CSO1</td>
<td>3,622.5</td>
<td>25.9%</td>
<td>47.9</td>
<td>50,075.6</td>
<td>17.8%</td>
<td>263.1</td>
<td>1,566.3</td>
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<tr>
<td></td>
<td>CSO2</td>
<td>1,064.1</td>
<td>7.6%</td>
<td>46.1</td>
<td>51,041.6</td>
<td>18.2%</td>
<td>434.7</td>
<td>535.0</td>
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<tr>
<td></td>
<td>CSO3</td>
<td>729.3</td>
<td>5.2%</td>
<td>96.7</td>
<td>38,365.5</td>
<td>13.7%</td>
<td>346.0</td>
<td>4,594.9</td>
</tr>
<tr>
<td></td>
<td>CSO4</td>
<td>2,820.1</td>
<td>20.1%</td>
<td>59.8</td>
<td>51,476.2</td>
<td>18.3%</td>
<td>488.3</td>
<td>1,533.4</td>
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<tr>
<td></td>
<td>CSO5</td>
<td>4,531.0</td>
<td>35.2%</td>
<td>115.0</td>
<td>47,266.5</td>
<td>16.8%</td>
<td>442.9</td>
<td>2,940.6</td>
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<td></td>
<td>CSO6</td>
<td>839.7</td>
<td>6.0%</td>
<td>65.0</td>
<td>42,768.7</td>
<td>15.2%</td>
<td>436.6</td>
<td>213.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14,006.6</td>
<td>100.0%</td>
<td>67.0</td>
<td>260,994.1</td>
<td>100.0%</td>
<td>365.6</td>
<td>11,344.0</td>
</tr>
</tbody>
</table>
Results: 2011 Analysis

- There were strong correlations between public cancer research funding and number of cancer deaths in all three countries (p<0.05).
- Some common cancer sites had far above from the linear regression, such as Breast Cancer, Leukaemia and Prostate Cancer, providing larger amount of public cancer research funding for these cancer sites than the other cancer sites regarding cancer death.

<table>
<thead>
<tr>
<th>Country</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>0.643**</td>
</tr>
<tr>
<td>US</td>
<td>0.850**</td>
</tr>
<tr>
<td>UK</td>
<td>0.606**</td>
</tr>
</tbody>
</table>

*p<0.05
Overall cancer research funding increased in Japan and UK whereas move down and up in US.
The proportion between CSOs are stable in US whereas “CSO1 Biology” seems decreased in UK and “CSO5 Treatment” increased in Japan.
Results: 2011-15 Analysis

- The amount of the cancer research funding were stable among cancer sites, particularly in US.
- “Leukaemia” has been decreased in UK
Discussion

- Annual amount of cancer research funding in Japan estimated at approximately US$ 258-386 million in total.
  - In the US, cancer research funding was estimated at approximately US$ 5,200 million in total (2011), which is 20 times higher than its in Japan.

- This study indicated that cancer research funding tends to be allocated by cancer site along with the cancer outcomes.
  - As Japan’s cancer research funding was mainly provided based on the research proposals submitted by researchers, the government’s control over the allocation may be limited. However, as a result, it was allocated relevant to cancer outcomes.
  - However, cancer research funding in the US and UK tend to be more relevant to cancer outcomes compared with its in Japan.

- This study indicated that Japan’s cancer research funding has room for improvement as for both increasing amount of funding and improving allocation of funding.

Acknowledgement:
This research supported by Japan Agency for Medical Research and Development (AMED).
Japanese government has promoting wide area of cancer research as the Practical Research for Innovative Cancer Control Project under the “Comprehensive 10-year Strategy for Cancer Control”.

This project includes:
- Area 1: basic research
- Area 2: development of technologies for prevention and early detection
- Area 3: development of innovative drugs
- Area 4: development of medical devices
- Area 5: establishment of standard therapies combining various treatment modalities
- Area 6: establishment of treatment suitable for various patient subgroups

For implementing this project effectively, National Cancer Research Center (NCC) has created a support organization funded by AMED (Japan Agency for Medical Research and Development).
- 3-years project
- CSO analysis becomes a part of the support organization, so-called “datamining project”
- Start using Dimensions (UberResearch) for analysing cancer research funding as well as the outcomes of the grants.
Datamining project

Development of public cancer research funding database

- MHLW Cancer Research funding data
- MEXT Cancer Research funding data

Public Cancer Research funding DB

Outcome data

International collaboration through ICRP and comparative analysis between FAs

Feedback and Collaboration

Cancer Research Funding Research

Provide comprehensive cancer research data to PS/PO through Dimensions

PS/PO
Thank you very much for your attention.