

The state of global lung cancer research 2004 to 2019: Brazil deep dive

Overview

Lung cancer has been the most common cancer in the world for several decades. Lung cancer is the most commonly occurring cancer in men and the third most commonly occurring cancer in women.¹ The American Cancer Society estimated around 228,000 new cases of lung cancer in 2020 (116,000 for men and 112,000 for women).² Research is essential to reduce the death toll from lung cancer and drive improvements in cancer prevention, screening, diagnosis and treatments.³

In 2014 the Global Lung Cancer Coalition (GLCC) commissioned the Institute of Cancer Policy (ICP) to examine the state of global lung cancer research. The study:⁴

- Identified the **top 24 countries publishing the most research** into lung cancer: Brazil was then ranked number 19
- Analysed whether **research outputs had changed over time**
- Showed that **lung cancer research lagged behind both breast and colorectal cancers** in terms of the volume of papers published
- Demonstrated that **some aspects of the disease and its treatment were under-investigated**, such as screening, diagnostics and supportive and palliative care

A new 2020 study from the ICP revisits and updates the findings.⁵ Encouragingly, every country in the top 24 has increased their research output. This briefing sets out the key findings for Brazil, now ranked as number 21 in the world in terms of volume of papers published.

However, these findings are published at a significant moment, with the COVID-19 pandemic meaning that many research budgets are being refocused. It is hard to imagine that COVID-19 will not have a profound impact on lung cancer research, but it is essential that budgets are protected as far as possible.

The Global Lung Cancer Coalition is calling on all countries to protect and invest in lung cancer research.

We welcome the increase in research into lung cancer from 2004 to 2018. This investment has contributed to advances in treatment, care and survival for people with lung cancer. The investments we make in lung cancer research today will make a difference for patients tomorrow. It is essential that all national governments:

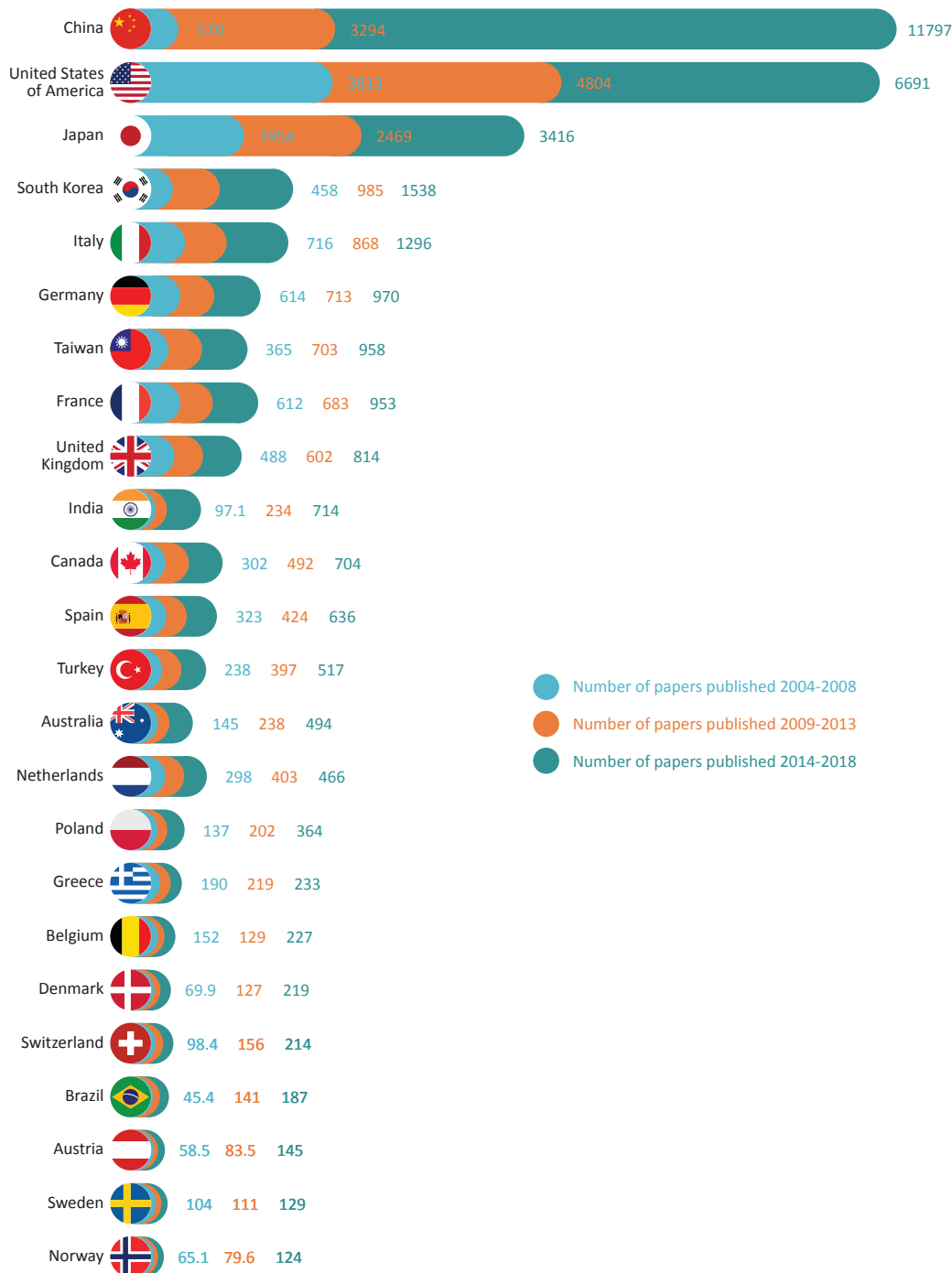
1. **Protect and invest in lung cancer research programmes**
2. **Encourage industry to continue investing in lung cancer research**
3. **Support research charities, particularly those with a drop in income due to COVID-19**
4. **Publish research spend on lung cancer on an annual basis**
5. **Collaborate with global partners to share research findings to improve patient care**

How has research output changed globally and in Brazil?

All countries in the top 24 responsible for the majority of lung cancer research have increased their research output between 2004 and 2018. Overall, the volume of published research has nearly tripled, rising from 12,508 papers between 2004 and 2008 to 35,720 papers published between 2014 and 2018.

Brazil is now ranked number 19 in the top 24 in terms of lung cancer research output, an increase of three since a decade ago.

Figure 1: Volume of global lung cancer research output, 2004 to 2018



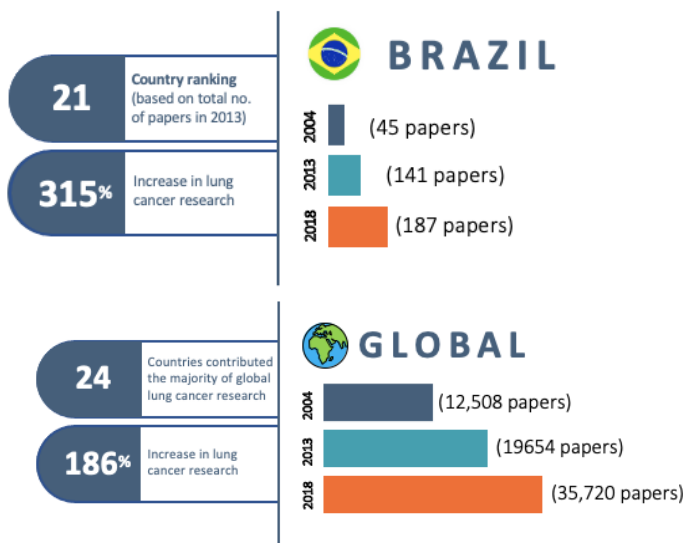
The table below shows the breakdown of papers published by each country over time and ranks each country by the volume of papers published. Between 2014 – 2018, Brazil published 187 papers compared to 45 between 2004-2008.

Figure 2: Volume of papers published by each country 2004-2018, and country ranking over time

| Country | 2004-2008 | 2009-2013 | 2014-2018 | Country ranking, 2004-08 | Country ranking, 2009-13 | Country ranking, 2014-18 | Ranking change over decade |
|--------------|---------------|---------------|---------------|--------------------------|--------------------------|--------------------------|----------------------------|
| China | 570 | 3,294 | 11,797 | 6 | 2 | 1 | ↑5 |
| USA | 3,813 | 4,804 | 6,691 | 1 | 1 | 2 | ↓1 |
| Japan | 1,954 | 2,469 | 3,416 | 2 | 3 | 3 | ↓1 |
| South Korea | 458 | 985 | 1,538 | 8 | 4 | 4 | ↑4 |
| Italy | 716 | 868 | 1,296 | 3 | 5 | 5 | ↓2 |
| Germany | 614 | 713 | 970 | 4 | 6 | 6 | ↓2 |
| Taiwan | 365 | 703 | 958 | 9 | 7 | 7 | ↑2 |
| France | 612 | 683 | 953 | 5 | 8 | 8 | ↓3 |
| UK | 488 | 602 | 814 | 7 | 9 | 9 | ↓2 |
| India | 97 | 234 | 714 | 20 | 15 | 10 | ↑10 |
| Canada | 302 | 492 | 704 | 11 | 10 | 11 | → |
| Spain | 323 | 424 | 636 | 10 | 11 | 12 | ↓2 |
| Turkey | 238 | 397 | 517 | 13 | 13 | 13 | → |
| Australia | 145 | 238 | 494 | 16 | 14 | 14 | ↑2 |
| Netherlands | 298 | 403 | 466 | 12 | 12 | 15 | ↓3 |
| Poland | 137 | 202 | 364 | 17 | 17 | 16 | ↑1 |
| Greece | 190 | 219 | 233 | 14 | 16 | 17 | ↓3 |
| Belgium | 152 | 129 | 227 | 15 | 20 | 18 | ↓3 |
| Denmark | 70 | 127 | 219 | 21 | 21 | 19 | ↑2 |
| Switzerland | 98 | 156 | 214 | 19 | 18 | 20 | ↓1 |
| Brazil | 45 | 141 | 187 | 24 | 19 | 21 | ↑3 |
| Austria | 59 | 84 | 145 | 23 | 23 | 22 | ↑1 |
| Sweden | 104 | 111 | 129 | 18 | 22 | 23 | ↓5 |
| Norway | 65 | 80 | 124 | 22 | 24 | 24 | ↓2 |
| | | | | | | | |
| World | 12,508 | 19,654 | 35,720 | | | | |

A comparison of Brazil’s increase in lung cancer research output to that in global research output can be seen in Figure 3 below:

Figure 3: Comparing Brazil lung cancer research output to global output



How does research into lung cancer in Brazil compare to research into other cancers?

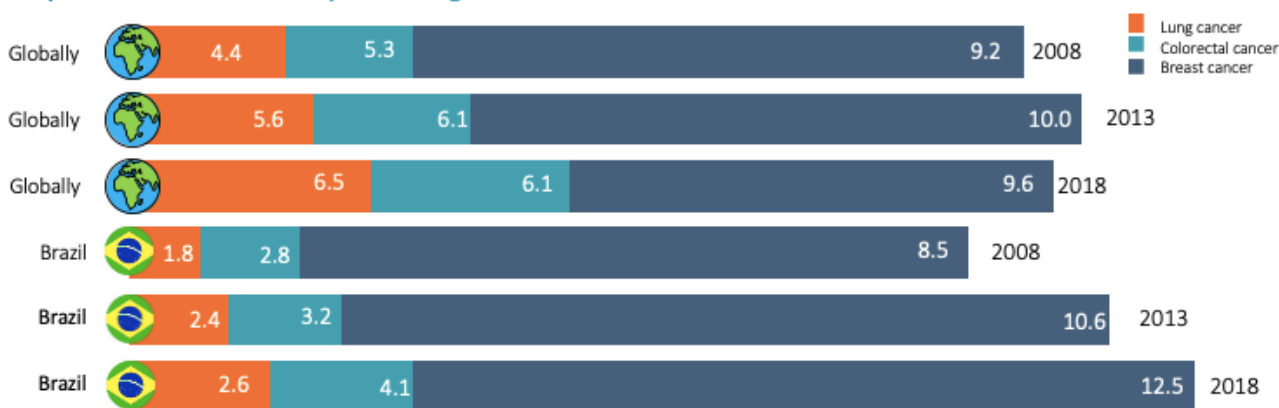
The ICP compared lung cancer to breast and colorectal cancers, which have a similar global burden of disease. The ICP’s first analysis in 2014 showed that lung cancer lagged behind both breast and colorectal cancers in terms of volume of research and proportion of all cancer research dedicated to the disease.

The new study shows that, worldwide, the volume of all cancer research has risen by more than 2.5 times, from 47,989 papers published in 2004 to 126,473 papers published in 2019.

Globally, lung cancer has overtaken colorectal cancer, in terms of number of published papers and proportion of all research dedicated to it. However, it still lags behind breast cancer. The same is not true for Brazil however, as set out in figure 4 below:

Figure 4: Change in volume and proportion of research output on lung cancer, vs colorectal cancer and breast cancer, 2004 to 2019

Proportions of research output on lung cancer vs colorectal cancer vs breast cancer



What lung cancer topics are being researched in Brazil?

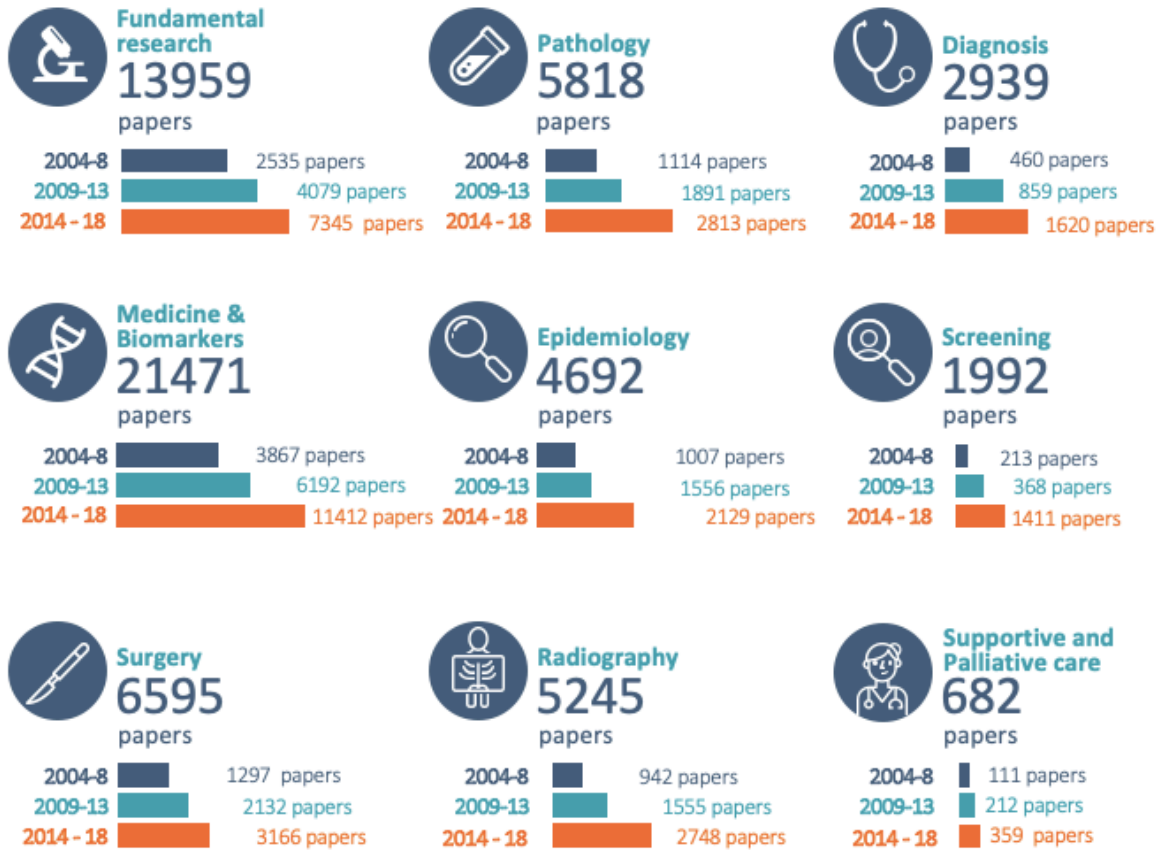
The ICP investigators categorised the published papers by their topic. Although the number of papers published has increased in each topic area, the proportions remained relatively static.

Globally, the topic of medicines and biomarkers remains the most researched topic, with 32% of papers published (11,412 papers) from 2014-2018. This is also the most researched topic in Brazil, with 94.7 papers published (figure 5):

Figure 5: Types of research undertaken



Globally, supportive and palliative care is still the least researched area, with 1% of research papers (359 papers) dedicated to it from 2014-2018. In Brazil, just 3.4 papers were published on supportive and palliative care. This is despite the fact that the majority of patients will require supportive care, given the poor survival rates in lung cancer. This area of research may be particularly vulnerable to any drop in income from research charities as a result of COVID-19.



Who funds lung cancer research, globally and in Brazil?

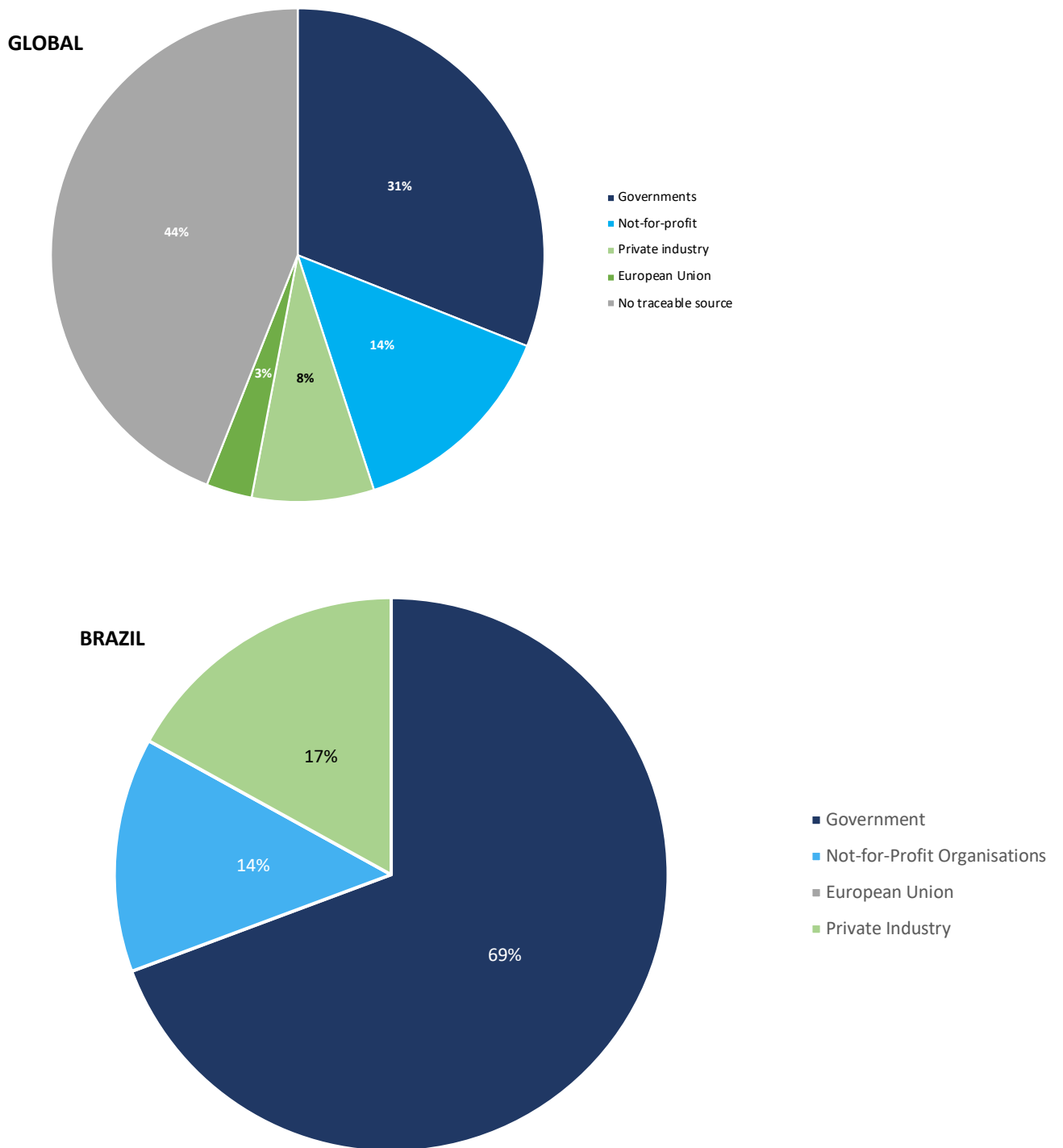
The ICP investigators also considered where the funding for lung cancer research came from. The funders can be broadly categorised into four groups: government funders; the European Union for EU countries; private industry; not-for-profit organisations (including research charities).

The ICP investigators looked at papers published between 2009 and 2013. Of the 19,644 papers published in these five years, 56% (11,015) had some acknowledged source of funding. Of these, 31% of papers had funding attributable to governments, 14% to not-for-profits, 8% to private industry and 3% to the European Union.

In Brazil, the majority of funding came from Government with 69% of all research funded through this route. Not-for-profits and private industry made up for 14% and 17% respectively.

A comparison of the global and Brazil funding patterns is set out in figure 6. Please note that this does not make any estimate of the size of spend, but purely the number of resulting papers:

Figure 6: Funding sources of global and Brazil lung cancer research papers, 2009-2018



It is important that policy makers know who is funding the research undertaken in their country and the potential influence different funders can exert on that research. Funders will have varying interests, aims, budgets and expectations, that can have both positive and potentially negative effects on the direction and quality of lung cancer research undertaken.

With the arrival of the COVID-19 pandemic, the GLCC is concerned that:

- If government budgets are redeployed from cancer to COVID-19, the impact for lung cancer research will be profound. Government bodies command large budgets which can, in normal times, be delivered reliably and sustainably.
- Many global healthcare companies have moved rapidly to commit resources to the search for diagnostics, treatments and vaccines for COVID-19, including companies with big cancer programmes. The impact for their R&D spend on cancer remains to be seen.
- Early evidence from GLCC members demonstrates that COVID-19 has led to a drop in income for many not-for-profit organisations,⁶ which are another important research funder. This will likely affect the funds that research charities have to spend in future years.

About the partners and contact information

The Global Lung Cancer Coalition (GLCC) is the international ‘voice’ of lung cancer patients.

Established in 2001, the GLCC is a unique partnership of 40 non-governmental patient organisations from 29 nations: Argentina, Australia, Brazil, Bulgaria, Canada, Czech Republic, Denmark, Egypt, France, Germany, Ireland, Israel, Italy, Japan, Mexico, Netherlands, Norway, Peru, Portugal, Russia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Turkey, UK and USA. The GLCC is dedicated to improving disease outcomes for all lung cancer patients worldwide. You can read more about at: www.lungcancercoalition.org

The GLCC’s member from Brazil is:

- [Oncoguia Institute](#)

To contact our secretariat, please email: glcc@roycastle.org

The Institute of Cancer Policy (ICP) brings together a distinguished global faculty dedicated to policy to improve care, education and research in global cancer. Based at King’s College, London and King’s Health Partners, the ICP conducts research into some of the world’s most important cancer public policy issue affecting the most vulnerable cancer patients. Collaborating through a network of local, national and global partners, the ICP’s mission is to conduct high quality, critical cancer policy research to improve the lives and outcomes of all cancer patients, in all settings.

You can read more about the ICP’s work at: <http://instituteofcancerpolicy.org>

References

- ¹ World Cancer Research Fund, Lung Cancer Statistics, available here: <https://www.wcrf.org/dietandcancer/cancer-trends/lung-cancer-statistics>
- ² American Cancer Society, Key Statistics for Lung Cancer (2020), available here: <https://www.cancer.org/cancer/lung-cancer/about/key-statistics.html#:~:text=The%20American%20Cancer%20Society's%20estimates,men%20and%2063%2C22%20in%20women>
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- ⁶ Global Lung Cancer Coalition, *Impact of COVID-19: findings from a GLCC members survey*, June 2020, available here: <http://www.lungcancercoalition.org/news/189/21/Impact-of-COVID-19-findings-from-a-GLCC-members-survey.html>