

# The State of Global Lung Cancer Research: 2014-2021



A report from the Global Lung  
Cancer Coalition and the  
Institute of Cancer Policy

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## Executive summary

The impact of lung cancer research cannot be understated, as the focus and findings of this research can have direct impacts on the introduction of new and innovative treatments, standards of care and more, and can significantly improve the experience of patients with lung cancer.

The Global Lung Cancer Coalition (GLCC) sought to better understand the status of lung cancer research globally and commissioned the Institute for Cancer Policy (ICP) to run a bibliometric analysis to provide insight into the current landscape of lung cancer research globally – including the potential impact of the COVID-19 pandemic – and any shifts and trends in research volume or content that were notable.

This work explored lung cancer research today and over the last decade, and considered questions including:

- Who is conducting and leading in lung cancer research around the world?
- How does the volume of lung cancer research compare to the volume of research into other cancers?
- What topic areas within lung cancer are being researched?
- How closely are countries working together on research?

The bibliometric analysis found that – particularly in the last two years – there has been a notable surge in the research undertaken in immuno-oncology, now the dominant area of research across lung cancer. A significant increase in international collaboration in research across all countries was also found, with China the sole country that did not see an increase in collaboration, and in fact saw a decrease. China was also an outlier in the sheer volume of research produced. While other countries saw a slowing of growth in research outputs, substantial growth was noted in China.

Due to delays in the publication of research, the impact of the COVID-19 pandemic is not fully clear. Any potential impact on reduced research activity may be uncovered for many years.

The GLCC would like to express gratitude to The ICP for their work and its findings. The GLCC recognises the fundamental value of research in improving the lives of patients with lung cancer and calls on all countries to protect and invest in lung cancer research.

## Methodology

The ICP investigators designed a complex, validated mathematical bibliometric algorithm to:

- Identify the total number of papers in cancer research for each year and in 24 leading countries
- Isolate the number of papers referencing lung cancer or other relevant key words in their title

This allowed the ICP investigators to identify a total number of papers and their topic, and to interpret trends. The authors' research institutes were used to identify which country or countries had contributed to each paper.

A fractional counting approach was used, in which a single paper totalled 1.0, and individual authors of the paper were a fraction of this total. For example, for a paper with many authors, including one author from Greece, this paper would count as 0.1 to the total number of papers published by Greece.

At this date, due to delays in the publication of research, it is likely that these results do not fully reflect the impact of the COVID-19 pandemic on research.

## Key findings

### Who is conducting lung cancer research?

The 24 countries responsible for the majority of lung cancer research globally are: Australia, Austria, Belgium, Brazil, Canada, China, Denmark, France, Germany, Greece, India, Italy, Japan, the Netherlands, Norway, Poland, South Korea, Spain, Sweden, Switzerland, Taiwan, Turkey, the UK and the USA.

Overall, the volume of published research globally has increased by almost one-third, rising from 38,847 papers between 2014 and 2017 to 51,293 papers between 2018-2021 (figure 1).

China has primarily driven this growth, dramatically expanding its research in lung cancer over the last decade. China surpassed the USA in 2015 to become the leading publisher, and by 2020 was publishing at a rate of more than twice that of the USA. In 2021, papers published by China accounted for nearly 36% of the world's total, compared to only 14% in 2011.

**Figure 1:**  
**Volume of global lung cancer research output, 2014-2017 and 2018-2021**



In stark opposition to China’s exponential growth over the last decade, there has been near stagnation in the other leading countries, including the USA, which saw only 5% growth from between 2014-2017 and 2018-2021 (see figure 2). Apart from China, Japan was the only leading country that showed marked growth, experiencing a 29% increase in papers published between 2014-2017 and 2018-2021. Yet this growth pales in comparison to the 81% growth that China saw over the same period.

While there has been growth in India, for the size of the population and level of disease burden, the growth is still relatively conservative. Greece, Sweden and Switzerland have also experienced growth in the number of papers published as a proportion of papers published globally.

**Figure 2: Volume of papers published by each country by year, 2014-2021**

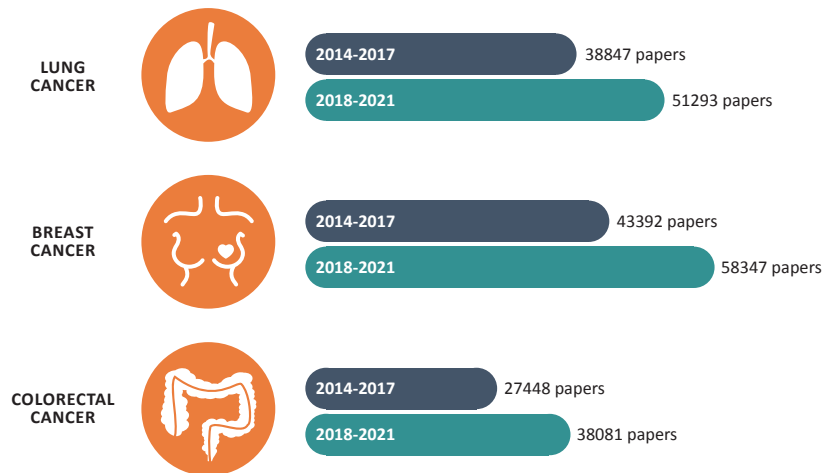
Country	2014	2015	2016	2017	2018	2019	2020	2021
China	1830.2	2284.5	2477.0	2845.8	3187.2	3808.3	4723.4	5321.6
USA	1950.0	2199.7	2093.0	2233.9	2213.7	2118.4	2270.9	2318.5
Japan	601.3	762.6	746.7	887.3	908.3	872.9	966.2	1120.9
Italy	276.4	361.4	393.6	400.1	388.2	436.0	510.3	559.9
South Korea	316.3	382.3	370.2	344.1	388.9	468.4	457.1	477.7
UK	328.7	340.2	363.4	380.2	374.0	396.4	378.4	416.4
France	294.7	314.6	373.2	397.6	370.5	377.9	380.4	403.8
Germany	293.3	331.4	343.4	321.5	332.7	318.7	328.5	394.5
Australia	252.5	292.7	305.4	304.4	288.5	329.2	357.3	342.1
Canada	257.1	301.6	304.1	291.5	294.7	282.5	279.5	330.2
India	110.6	159.0	196.5	215.4	206.6	214.9	241.0	325.0
Spain	200.8	190.2	224.8	230.8	205.9	215.8	229.2	283.1
Taiwan	199.5	240.5	217.4	216.9	205.8	246.3	258.4	276.3
Turkey	123.9	146.9	188.0	149.8	173.6	139.0	220.4	222.9
Netherlands	163.1	184.4	203.1	184.8	181.3	169.0	216.1	221.4
Poland	50.2	82.2	83.4	94.5	98.4	106.4	88.5	130.7
Switzerland	70.1	87.8	90.2	92.5	85.2	91.0	104.5	115.7
Belgium	76.2	84.2	86.0	95.3	75.7	91.8	70.0	112.1
Brazil	86.6	92.7	83.5	85.9	108.6	83.0	111.1	110.1
Sweden	72.7	55.6	67.5	54.6	81.9	65.8	74.2	98.2
Norway	29.7	29.2	40.4	64.2	69.9	66.4	92.9	97.1
Denmark	70.9	83.3	67.6	60.4	67.2	69.8	66.9	93.3
Greece	54.3	70.1	66.5	63.6	74.2	64.3	67.8	85.7
Austria	45.9	39.0	42.5	39.1	34.5	47.0	57.5	61.4
<b>World</b>	<b>7755.0</b>	<b>9116.3</b>	<b>9427.3</b>	<b>10054.3</b>	<b>10415.4</b>	<b>11079.1</b>	<b>12550.4</b>	<b>13918.4</b>

### How does research into lung cancer compare to other cancers?

The ICP compared lung cancer to breast and colorectal cancers, which have a similar global burden of disease. The ICP's 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 almost doubled, from 95,242 papers published in 2014 to 177,544 papers published in 2021. While the volume of lung cancer research has increased over this period, as a proportion of all global research lung cancer has decreased its share from 8.6% in 2014-2017 to 8.4% in 2018-2021. This means that while lung cancer surpasses colorectal cancer both in terms of number of published papers and proportion of all research, it still lags behind breast cancer in terms of the number of papers and proportion of global research dedicated to it (figure 3).

**Figure 3:**  
Change in volume and proportion of research output on lung cancer, vs colorectal cancer vs breast cancer, 2014-2017 and 2018-2021



It is also noteworthy that this growth has been driven by the increase research from China (figure 1). Further information on this trend can be found in the GLCC briefing *'The rise of China in global lung cancer research: 2014-2021'*.

### Which lung cancer topics are being researched?

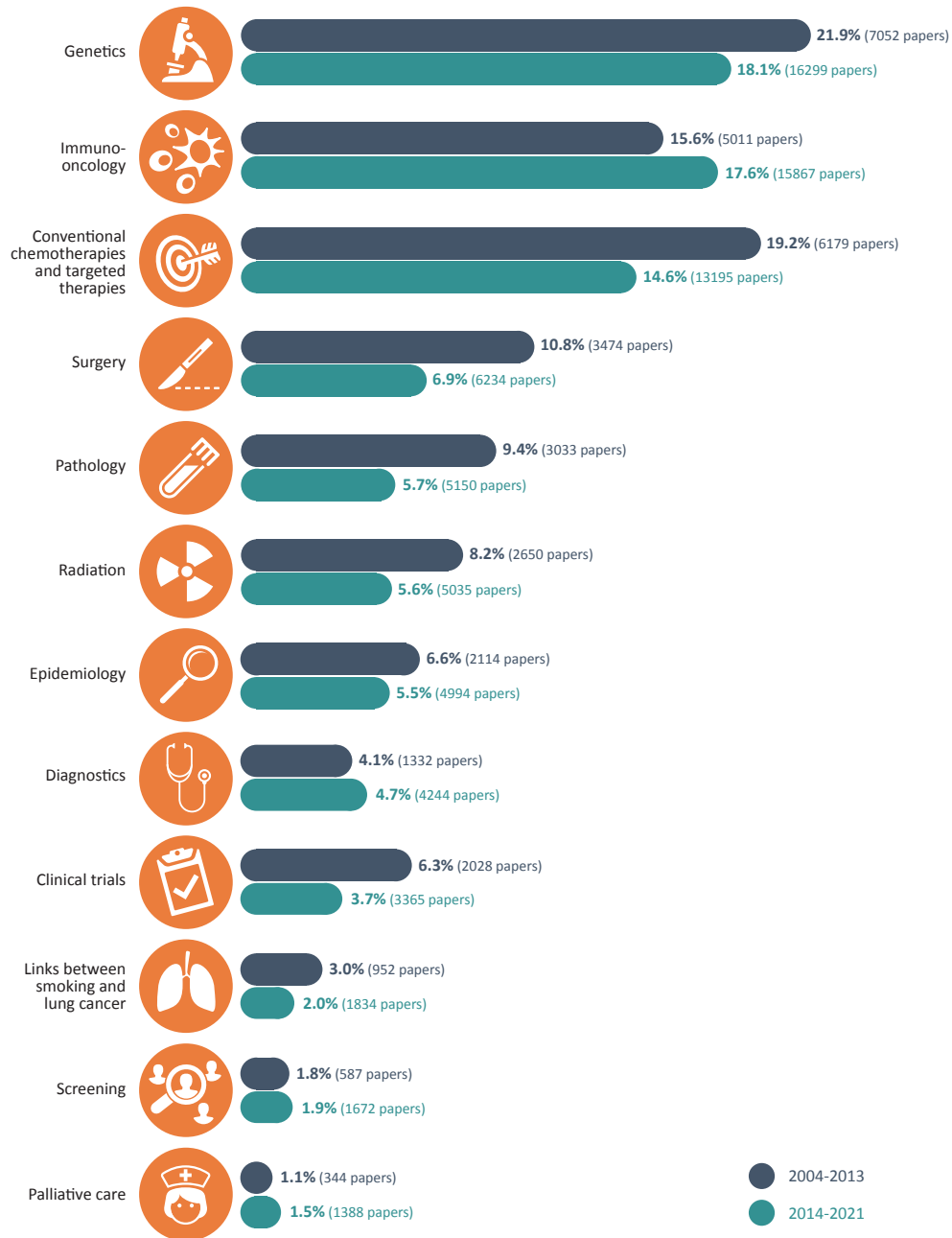
The ICP investigators categorised the published papers by their topic. As set out in Figure 4, the number of papers published has increased across all topic areas. However, the proportion of research dedicated in all areas – with the exception of immuno-oncology, diagnostics, screening and palliative care – decreased, and we saw a growing singularity of focus on immuno-oncology.

While papers focused on diagnostics, screening and palliative care increased as a proportion of all lung cancer research papers, this growth was minimal, with a less than 0.6% increase in each area. In contrast, immuno-oncology saw an increase in papers from 5,011 in 2004-2013 to 15,867 in 2014-2021.

Immuno-oncology can provide targeted treatment of cancer by helping a patient's own immune system to recognise and destroy cancer cells more effectively, and while it has the potential to bring hope to many, the increased focus on this area seems to come at the cost of other research areas. This deprioritisation of the development of other treatments – including surgery and radiation – and research into other critical areas – including genetics and palliative care – could have significant and long-term ramifications for patients, limiting the treatment, care and support that health systems can offer.

Supportive and palliative care is still the least researched area, representing just 1.5% of all lung cancer research papers (2014-2021). The lack of attention on this key topic area continues to cause concern, as the majority of lung cancer patients will require supportive care at various points throughout their journey.

**Figure 4:**  
Types of research undertaken by topic area as percentage of total lung cancer papers, 2004-2013 and 2014-2021



### How closely are countries working together?

International collaboration is central to scientific advancement and the development of treatment, support and care that is relevant and accessible to all patients, regardless of geography or background.

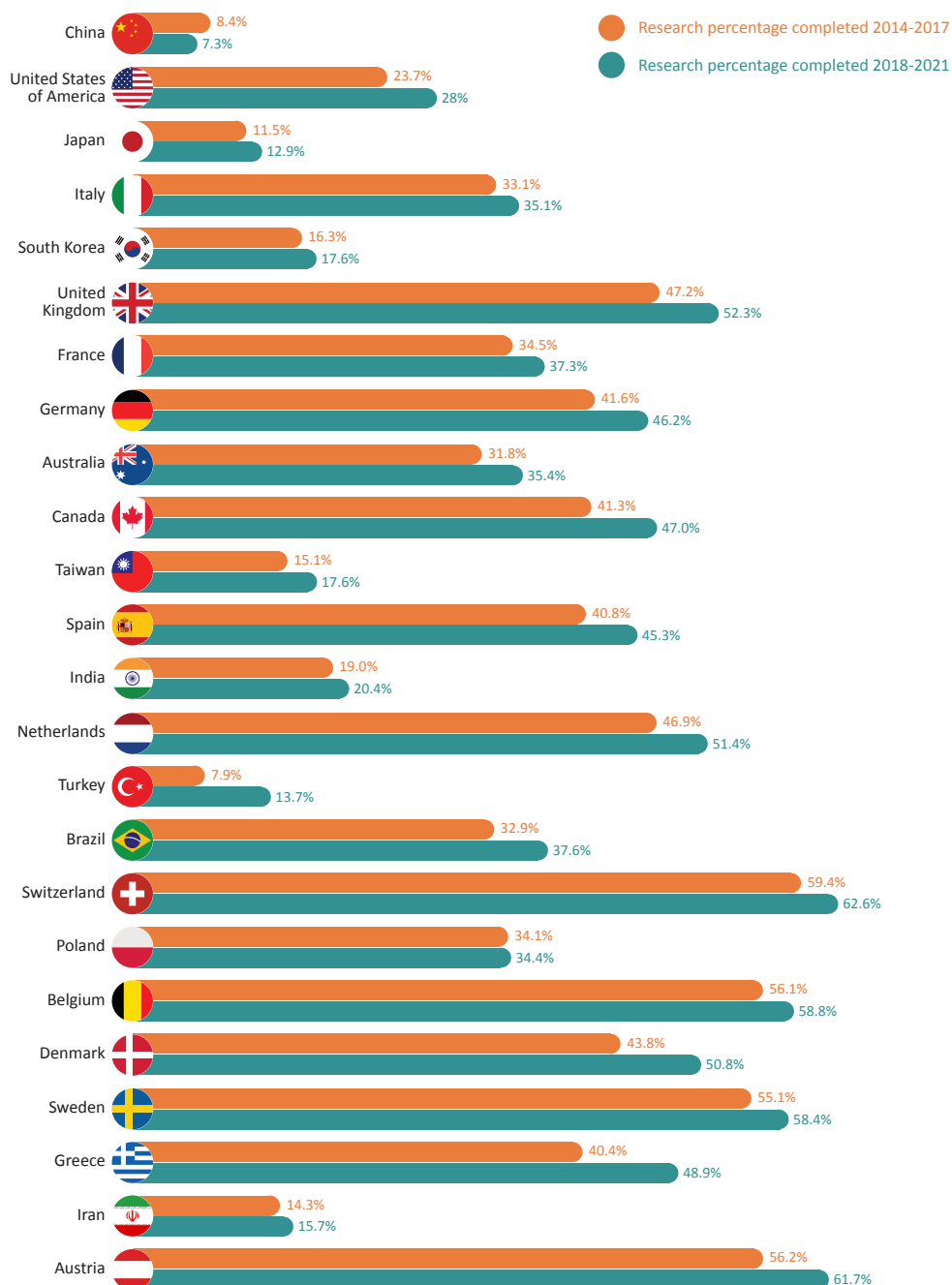
There is clear evidence that international collaboration has become more prevalent – between 2014-17 and 2018-21 the percentage of research completed with international collaboration increased in every country, with the exception of China (see figure 5). As expected, the smaller European countries collaborated internationally the most, such as



Switzerland, Austria and Belgium, in which 62.6%, 61.7% and 58.8% of research respectively, was completed with international collaboration.

Greece and Denmark had the greatest increase in international collaboration, seeing a jump from 40.4% to 48.9% and 43.8% to 50.8% respectively between 2014-2017 and 2018-2021. The near-universal upward trend in international collaboration in research is promising – China is the only country that saw a decrease in the percentage of research completed with international collaboration between 2014-17 and 2018-21, and between 2018-2021 had the lowest level of collaboration of any country by a notable margin.

**Figure 5:**  
**Percentage of national research completed with international collaboration,**  
**2014-2017 and 2018-2021**



## Call to action

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

We welcome the increase in research into lung cancer seen over the last decade. 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 therefore essential that national governments:

- Protect and invest in lung cancer research programmes
- Encourage industry to continue investing in lung cancer research
- Publish research spend on lung cancer on an annual basis
- Prioritise collaboration with global partners to conduct research and share findings to improve patient care

## Contact the partners

### The Global Lung Cancer Coalition

The Global Lung Cancer Coalition is an alliance of charitable/not for profit organisations from across the world, with a key focus on improving outcomes for those affected by lung cancer. Established in 2001, the GLCC comprises 43 non-government organisations from 30 nations: Argentina, Australia, Brazil, Bulgaria, Canada, Czech Republic, Denmark, Egypt, France, Germany, Greece, 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 our work on our website: [www.lungcancercoalition.org](http://www.lungcancercoalition.org)

To contact our secretariat, please email: [glcc@roycastle.org](mailto:glcc@roycastle.org)

### Institute of Cancer Policy

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 issues 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 their work on their website:  
<https://www.kcl.ac.uk/research/global-oncology-group>