COMITÉ NATIONAL DE COORDINATION DE LA RECHERCHE

What is France's place in terms of cancer research?

Analysis of scientific production 2010-2019
France & Worldwide

GLOBAL REPORT

CNCR Bibliometrics Unit | February 2021

Contents

I Introduction

Public hospitals are major players in research in France. The Public Health Code states on several occasions that active participation in research is one of the missions attributed to Healthcare Establishments, specifying that they **"participate in research and innovation in healthcare"** and organize **"education (...) [and] medical and pharmaceutical research".**

Maintaining a high level of medical research is crucial in several ways: 1) Today's research is the foundation upon which we build the medical progress and improved quality and safety of healthcare of the future; especially in chronic diseases such as cancer, the incidence of which tends to increase and for which the survival of those affected is tending to improve; 2) Research plays a considerable role in maintaining the nation's independence in terms of healthcare, with stakes that revealed themselves to be all the more fundamental during the Coronavirus crisis; 3) Research excellence is an important factor of attractiveness, motivating professionals to commit to and remain in public establishments.

Cancer is a major public health problem worldwide. According to the WHO, it resulted in the death of nearly 9.6 million people in 2018, making it the second leading cause of death worldwide at around 1 in 6 deaths [1]. In 2018, the number of new cases was estimated at 18 million. Cancer's economic impact is also very important, with a global cost in 2010 estimated at 1.2 billion US dollars [2].
In France, the number of new cancer cases is 382,000, meaning more than 1,000 new cancer cases are diagnosed every day. Cancer is the leading cause of death in men, and the second in women. In 2018, 157,000 people died of cancer; 57% of them were men.
Between 2003 and 2020, France implemented 3 successive "Cancer Plans" in its quest to fight cancer, which undoubtedly enabled major advances:

- The first Cancer Plan (2003-2007) made it possible to structure the landscape for oncology and create the French National Cancer Institute (INCa).
- The 2009-2013 Cancer Plan encouraged personalized treatment and the development of therapeutic innovations.
- The 2014-2019 Cancer Plan focused on the needs and expectations of patients and their loved ones. It notably established the Right To Erasure for patients.

Despite these 3 Plans and their advances, incidence and mortality rates remain very variable to this day, depending on the different organs affected and the sex of the patients. There are also great variations depending on geographical locations.
Concurrent with advances in patient care, further efforts have been invested in research and how to structure it by coordinating programs led by Healthcare Establishments (University Hospital Centers [CHU], Cancer Treatment Centers [CLCC] and Hospital Centers [CH]) and Research Units certified by Universities or Public Scientific and Technological Establishments (EPST) through the creation of Integrated Cancer Research Sites (SIRIC). This has made it possible to place oncology among the main research themes of Healthcare Establishments. Previous studies have shown that in CHU, 1 scientific article in 5 relates to cancer.
Some 10 years after the launch of the second Cancer Plan, it became essential to quantitatively and qualitatively assess the cancer research carried out in France and compare it with that of other large countries. FHF Cancer and the French National Committee for Research Coordination (CNCR), long-time associates within the framework of a partnership to promote public oncology, thus carried out a detailed analysis of cancer research.
To quantify the research carried out, we carried out 3 analyses:

- An analysis of clinical studies, based on studies recorded in the ClinicalTrials.gov registry.
- An analysis of the sponsorship and inclusions of clinical studies led by Healthcare Establishments in France, based on the national SIGREC database.
- An analysis of scientific publications indexed in the Web of Science, a bibliometric reference base.

This report is therefore divided into several main parts, corresponding to the various approaches chosen.
This report details indicators for all types of cancer. Organ-specific fact sheets are also available.

On the cusp of France's new 10-year cancer strategy, this report represents an exhaustive inventory of oncology research in France; highlighting strengths to be consolidated, identifying areas for improvement, and guiding the public authorities in their future operations.

A

Global cancer clinical trials: interventional and observational studies

The number of cancer clinical studies around the world continues to rise, year after year. Indeed, the analysis of studies on cancer registered on the ClinicalTrials database [3] from 2010 to 2019 reveals that the number of interventional studies on cancer has increased from approximately 2,850 studies in 2010 to more than 4,500 studies in 2019.

However, this growth rate is not specific to this theme; the percentage of studies on cancer compared to all themes combined remains close to 20% [Table 1 & Figure 1].

Launch year	Interventional Cancer Worldwide	Interventional All themes Worldwide	Percentage of interventional studies worldwide: Cancer/All themes
2010	**2,848**	13,349	21%
2011	**2,961**	14,119	21%
2012	**3,033**	14,896	20%
2013	**3,129**	15,717	20%
2014	**3,468**	17,304	20%
2015	**3,887**	18,566	21%
2016	**4,131**	19,673	21%
2017	**4,327**	20,016	22%
2018	**4,501**	20,833	22%
2019	**4,571**	20,836	22%
TOTAL	**36,856**	**175,309**	**21%**

Table 1 - Evolution of the number of interventional studies worldwide: Cancer vs. All themes.

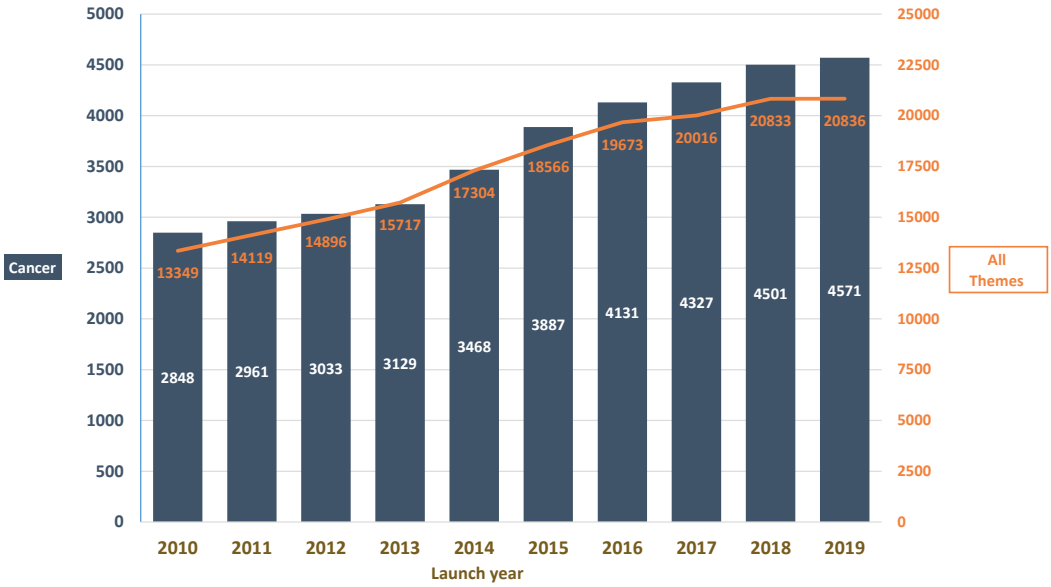


Figure 1 - Evolution of the number of interventional studies worldwide: Cancer vs. All themes.

Analysis of funding sources for interventional clinical studies on cancer around the world shows that the funding of these studies has changed little over time: around ¾ of these clinical studies receive public funding, and industrial funding is responsible for 40% (a single study can have several sources of funding) [Figure 2].

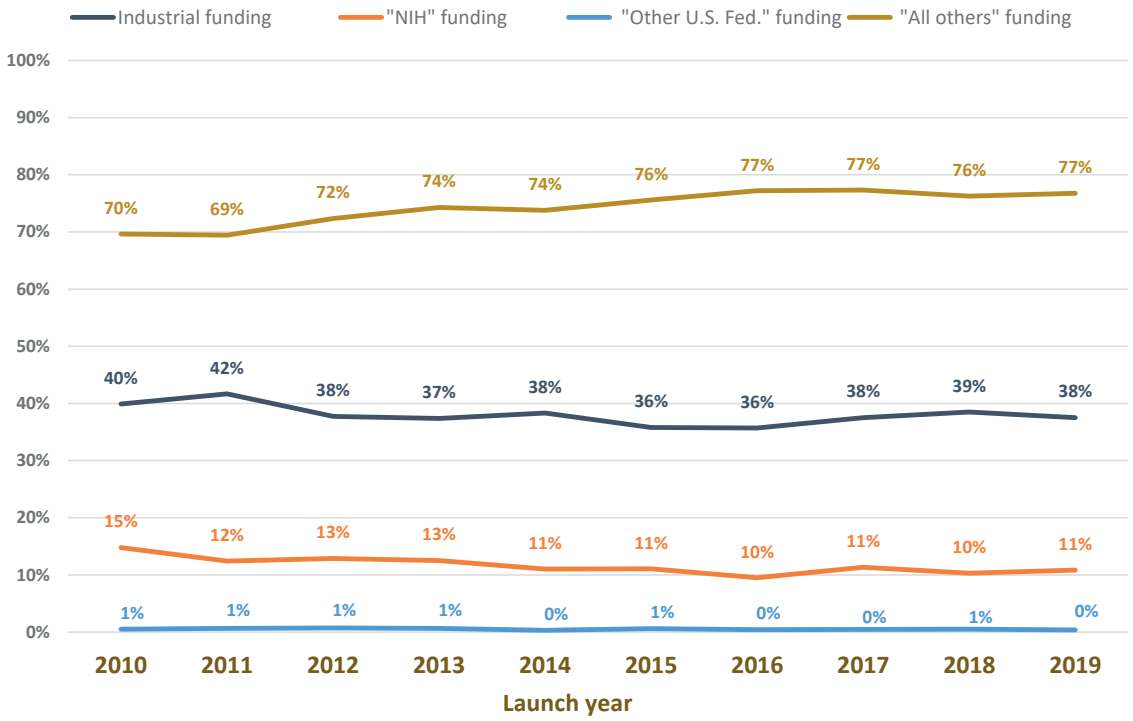


Figure 2 - Evolution of the percentage of the number of interventional studies on cancer worldwide according to the source of funding.

When comparing observational studies around the world, the same growth phenomena as interventional studies is apparent, though the volume of observational studies is 4 times lower than that of interventional studies [**Table 2 & Figure 3**].

It should also be noted that public funding is greater for this type of studies on cancer, and is used for almost 9 out of 10 studies [**Figure 4**].

Launch year	**Observational Cancer Worldwide**	Observational All themes Worldwide	Percentage of observational studies worldwide: Cancer/All themes
2010	**716**	3,878	18%
2011	**751**	4,000	19%
2012	**767**	4,174	18%
2013	**715**	4,194	17%
2014	**828**	4,709	18%
2015	**872**	4,973	18%
2016	**992**	5,538	18%
2017	**1,028**	5,835	18%
2018	**1,056**	5,962	18%
2019	**1,092**	6,026	18%
TOTAL	**8,817**	**49,289**	**18%**

Table 2 - Evolution of the number of observational studies worldwide: Cancer vs. All themes.

For more information:
Cancer Sheet
Baseline

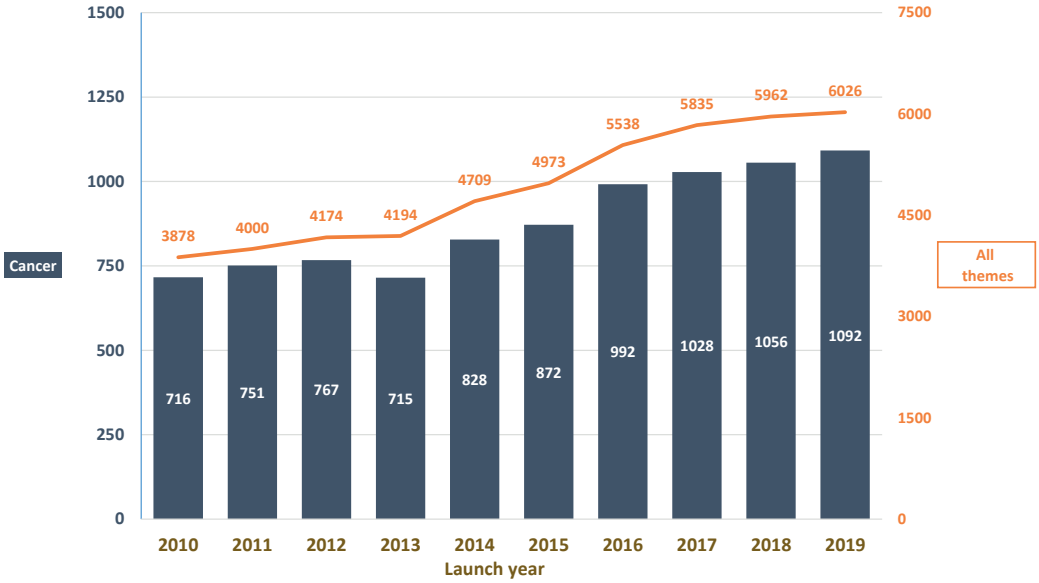


Figure 3 - Evolution of the number of observational studies worldwide: Cancer vs. All themes.

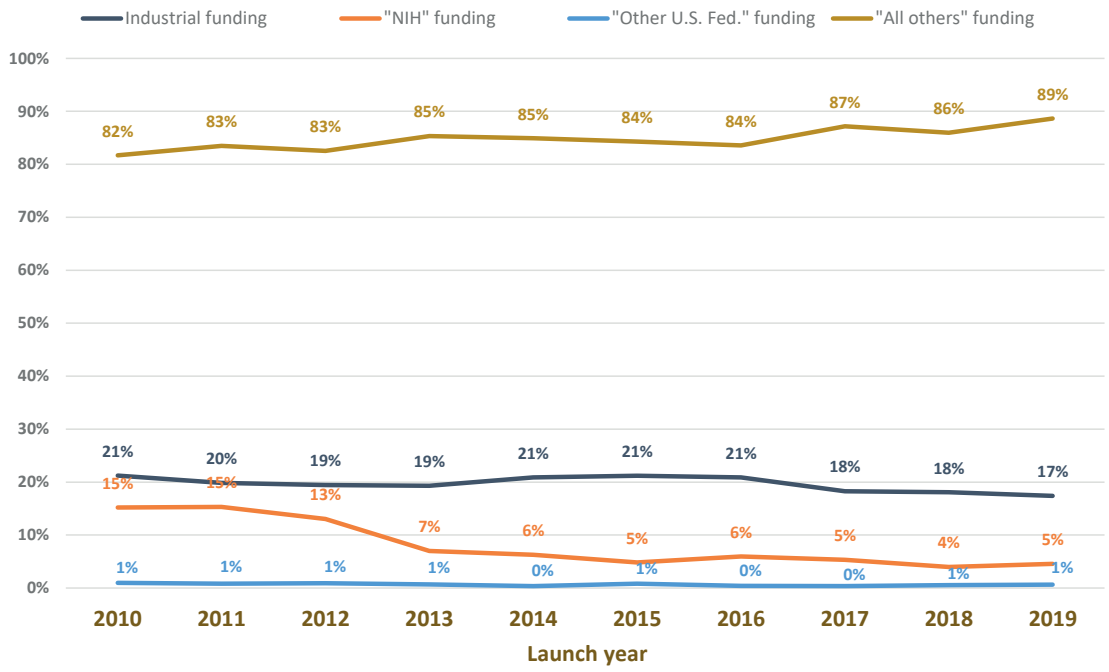


Figure 4 - Evolution of the percentage of the number of observational studies on cancer worldwide according to the source of funding.

B

Place of cancer clinical trials in France: interventional vs. observational

The previous analysis provided us with the global trends. What about these trends in France? The number of interventional studies on cancer in France has noticeably increased over time, from around 285 studies in 2010 to 400 studies in 2019 [Figure 5]. As with interventional studies around the world, this rate of growth is not specific to the theme of cancer. However, in France, the percentage of interventional studies on cancer in relation to all themes combined is almost 30%, compared to 20% worldwide [Table 1 vs Table 3].

Launch year	Interventional Cancer Worldwide	Interventional All themes Worldwide	Percentage of interventional studies worldwide: Cancer/All themes
2010	**284**	979	29%
2011	**322**	1,100	29%
2012	**344**	1,158	30%
2013	**364**	1,255	29%
2014	**374**	1,319	28%
2015	**415**	1,464	28%
2016	**404**	1,374	29%
2017	**401**	1,388	29%
2018	**422**	1,462	29%
2019	**400**	1,442	28%
TOTAL	**3,730**	**12,941**	**29%**

Table 3 - Evolution of the number of interventional studies in France: Cancer vs. All themes.

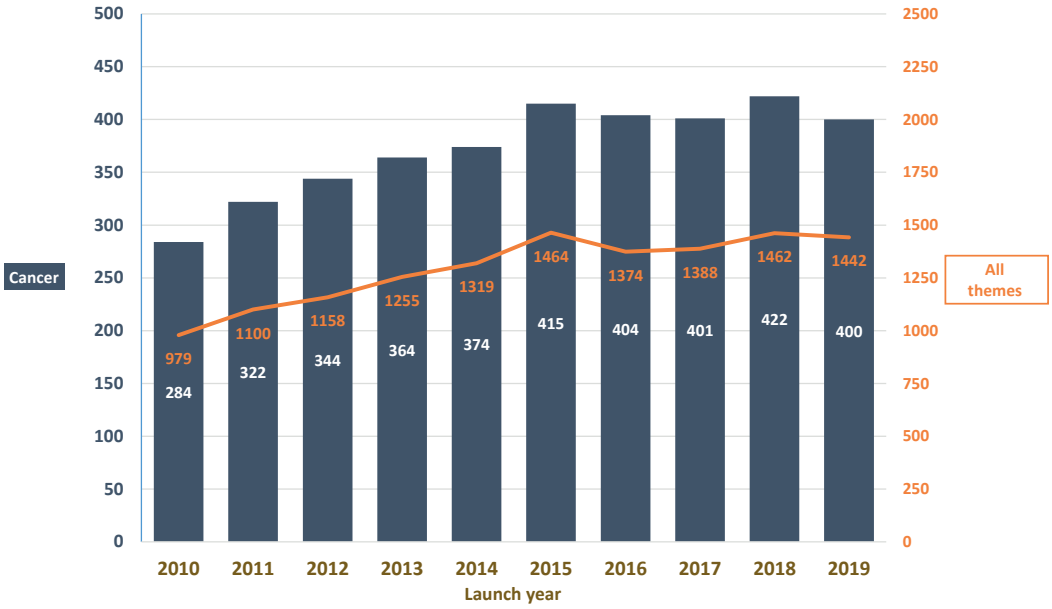


Figure 5 - Evolution of the number of interventional studies in France: Cancer vs. All themes.

The share of industrial funding is higher in France than for all interventional studies around the world, with the funding of around 50% of studies in France compared to the funding of 40% of the volume of studies worldwide. The trend is quite the opposite for public funding, with the funding of 55% of studies in France compared to around 75% worldwide [Figure 2 & Figure 6].

Figure 6 also shows the reversal of trends in the funding of studies on cancer in France, with industrial funding that increased during the first period, then fell to 48% in 2019. Conversely, "Other" funding, which namely comprises academic sponsors (Healthcare Establishments, Cooperative Groups, etc.) has continued to grow, reaching 64% in 2019.

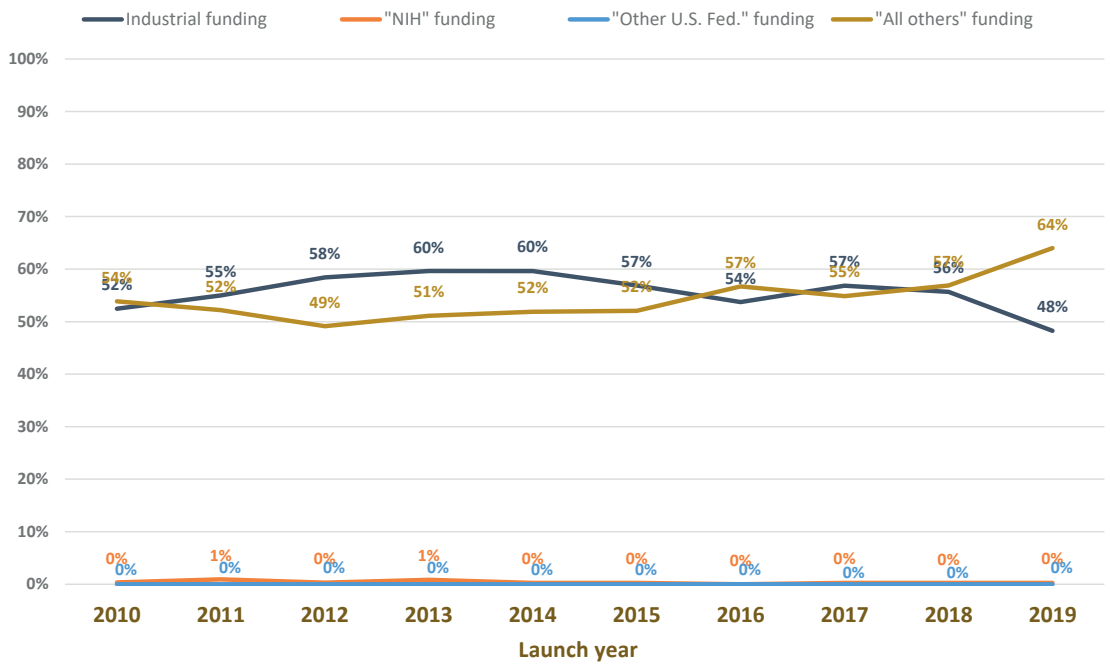


Figure 6 - Evolution of the percentage of the number of interventional studies on cancer in France according to the source of funding.

The analysis of observational studies on cancer in France shows that the ratio of interventional-to-observational studies in France is almost identical to that of the global level, with a multiplying factor of 4 [**Table 1 vs. Table 2 & Table 3 vs. Table 4**].

There is also a notable drop in industrial funding for this type of study [**Figure 8**].

Launch year	Observational Cancer Worldwide	Observational All themes Worldwide	Percentage of observational studies worldwide: Cancer/All themes
2010	**51**	267	19%
2011	**43**	266	16%
2012	**67**	340	20%
2013	**53**	387	14%
2014	**83**	480	17%
2015	**93**	535	17%
2016	**106**	614	17%
2017	**124**	684	18%
2018	**156**	799	20%
2019	**130**	773	17%
TOTAL	**906**	**5,145**	**18%**

Table 4 - Evolution of the number of observational studies in France: Cancer vs. All themes.

For more information:
Cancer Sheet
Hematology

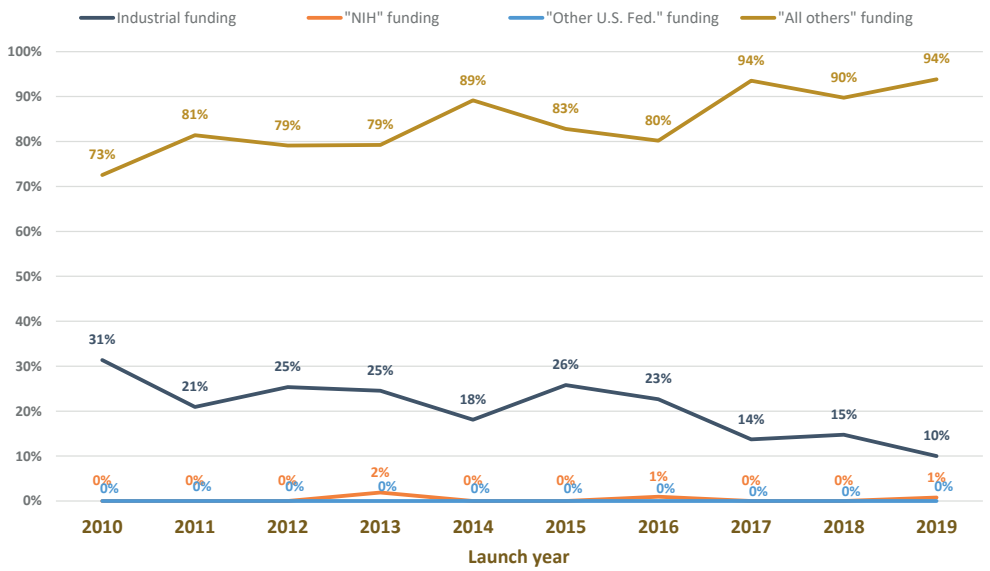


Figure 8 - Evolution of the percentage of the number of observational studies on cancer in France according to the type of funding.

Table 5 shows France's share in interventional studies, for both all themes combined and those specifically relating to cancer. For all themes combined, France participates in around 7.4% (12,941/36,856) of interventional studies carried out worldwide. This percentage rises to 10.1% (3,730/36,856) for interventional studies on cancer, which testifies to the importance of cancer research in France.

Interventional studies												
Theme	"Geographical scope"	Launch year										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL
Cancer	Worldwide	2,848	2,961	3,033	3,129	3,468	3,887	4,131	4,327	4,501	4,571	36,856
	France	284	322	344	364	374	415	404	401	422	400	3,730
	% France/Worldwide	**10%**	**11%**	**11%**	**12%**	**11%**	**11%**	**10%**	**9%**	**9%**	**9%**	**10%**
All themes	Worldwide	13,349	14,119	14,896	15,717	17,304	18,566	19,673	20,016	20,833	20,836	175,309
	France	979	1,100	1,158	1,255	1,319	1,464	1,374	1,388	1,462	1,442	12,941
	% France/Worldwide	**7%**	**8%**	**8%**	**8%**	**8%**	**8%**	**7%**	**7%**	**7%**	**7%**	**7%**

Table 5 - Comparison of the evolution of interventional studies in France vs. worldwide.

Observational studies												
Theme	"Geographical scope"	Launch year										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL
Cancer	Worldwide	716	751	767	715	828	872	992	1,028	1,056	1,092	8,817
	France	51	43	67	53	83	93	106	124	156	130	906
	% France/Worldwide	**7%**	**6%**	**9%**	**7%**	**10%**	**11%**	**11%**	**12%**	**15%**	**12%**	**10%**
All themes	Worldwide	3,878	4,000	4,174	4,194	4,709	4,973	5,538	5,835	5,962	6,026	49,289
	France	267	266	340	387	480	535	614	684	799	773	5,145
	% France/Worldwide	**7%**	**7%**	**8%**	**9%**	**10%**	**11%**	**11%**	**12%**	**13%**	**13%**	**10%**

Table 6 - Comparison of the evolution of observational studies in France vs. worldwide.

Table 6 provides the same data for observational studies: no differences are observed between studies on cancer and other themes, with the participation rate being close to 10% in both cases.

C

France's positioning in the world: interventional studies and types of funding

France is consequently involved in approximately 10% of interventional studies on cancer around the world. It is thus of interest to ascertain France's position in relation to other countries. To do so, countries have been ranked, firstly by taking all sources of funding into account, and secondly by distinguishing studies with exclusively industrial funding on the one hand and non-industrial funding on the other.

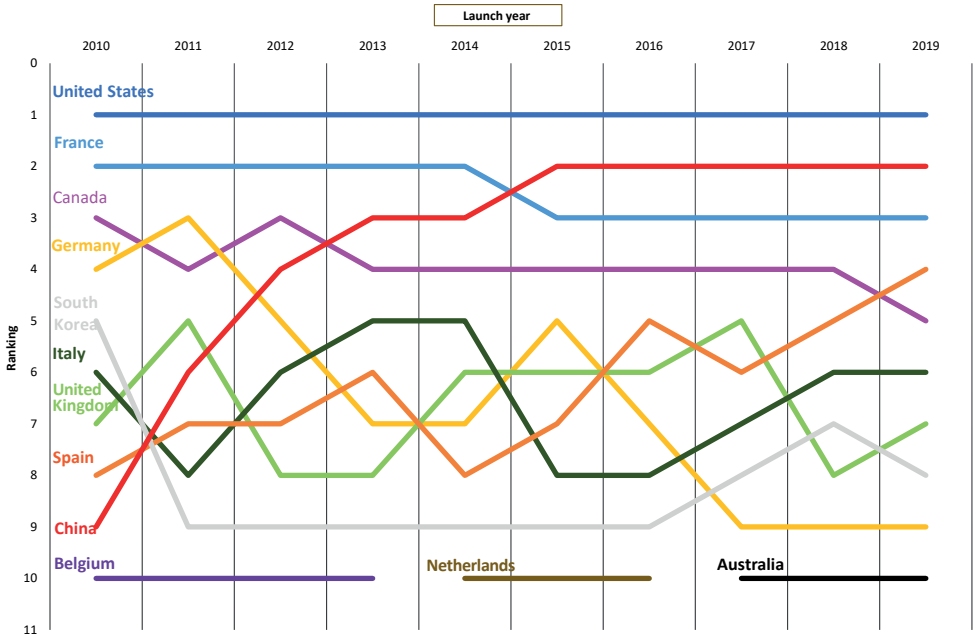


Figure 9 - Ranking of the top 10 "investigator" countries worldwide according to the number of interventional studies on cancer, all funding combined.

The United States always comes in first place, worldwide, regardless of the year in which the study was launched or its source of funding. In the ranking that does not distinguish between sources of funding [**Figure 9**], China made a clear breakthrough in 2015, taking 2nd place from France, which has maintained 3rd place since then. **Figure 10**, which excludes the United States, shows the progression of the various countries in terms of their number of open studies: there is an exponential increase in China, which has reached a number of studies twice as high as that of France while remaining far behind the United States, as the latter launched over 1,900 studies in 2019 (figures not portrayed in **Figure 10**).

For more information:
Cancer Sheet
Multiple myeloma of the bones

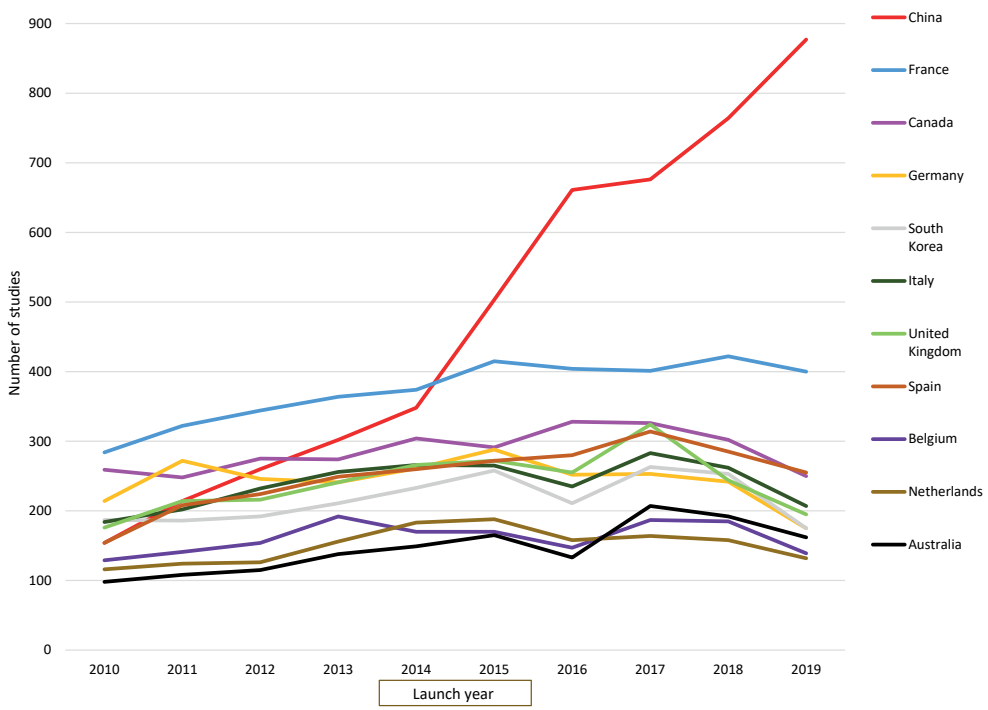


Figure 10 - Evolution of the top 10 "investigator" countries worldwide (excluding the United States) according to the number of interventional studies on cancer, all funding combined

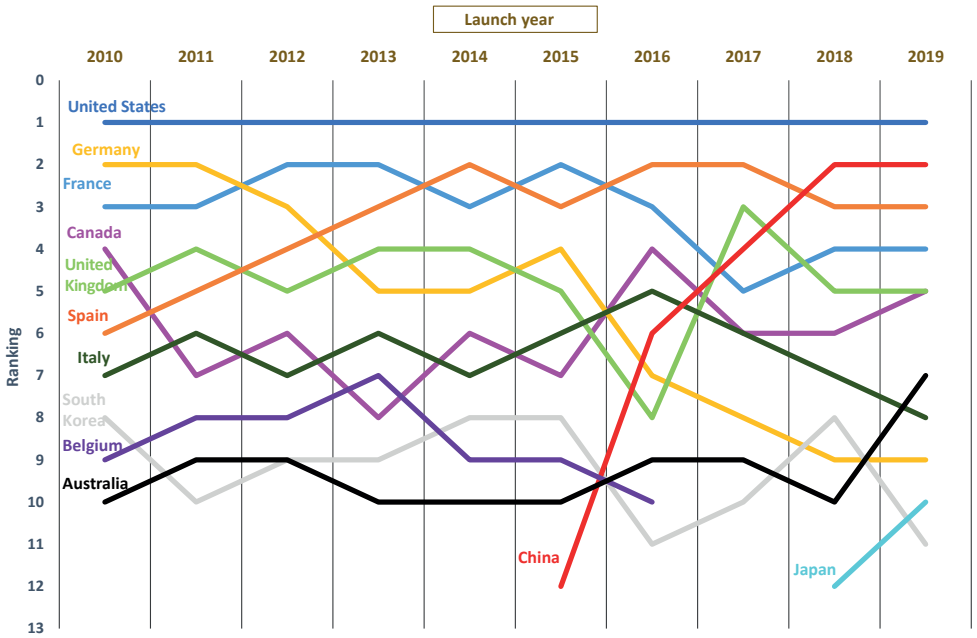


Figure 11 - Ranking of the top 10 "investigator" countries worldwide according to the number of interventional studies on cancer with exclusively industrial funding.

France maintains both stable growth in the number of studies and its lead compared to other countries. Germany dropped drastically from 4th place in 2010 to 9th in 2019. For countries that ranked between 4th and 9th place, the evolution of their number of interventional studies on cancer, all funding combined, can also be seen to slightly decline.

Funding sources are available at ClinicalTrials.gov. The data can therefore be analyzed according to the various types of funding. **Figure 11 & Figure 12**, which exclude the United States, show the same data but only taking into account studies with exclusively industrial funding: Spain has made an important breakthrough in the ranking, moving from 6th to 3rd place (from 130 studies in 2010 to 235 studies in 2019).

France is behind Spain, but both countries show a slight downward trend in their number of studies. China's breakthrough is less pronounced for industrial funding, but it still held 2nd place as of 2018.

It would be interesting to study Spain more closely, and seek to understand the origin of this significant increase in industrial trials: motivation of the investigators, specific incentives, medico-regulatory circuits, and so on. The evolution of research funding methods in Spain (public and private funding) could also be investigated.

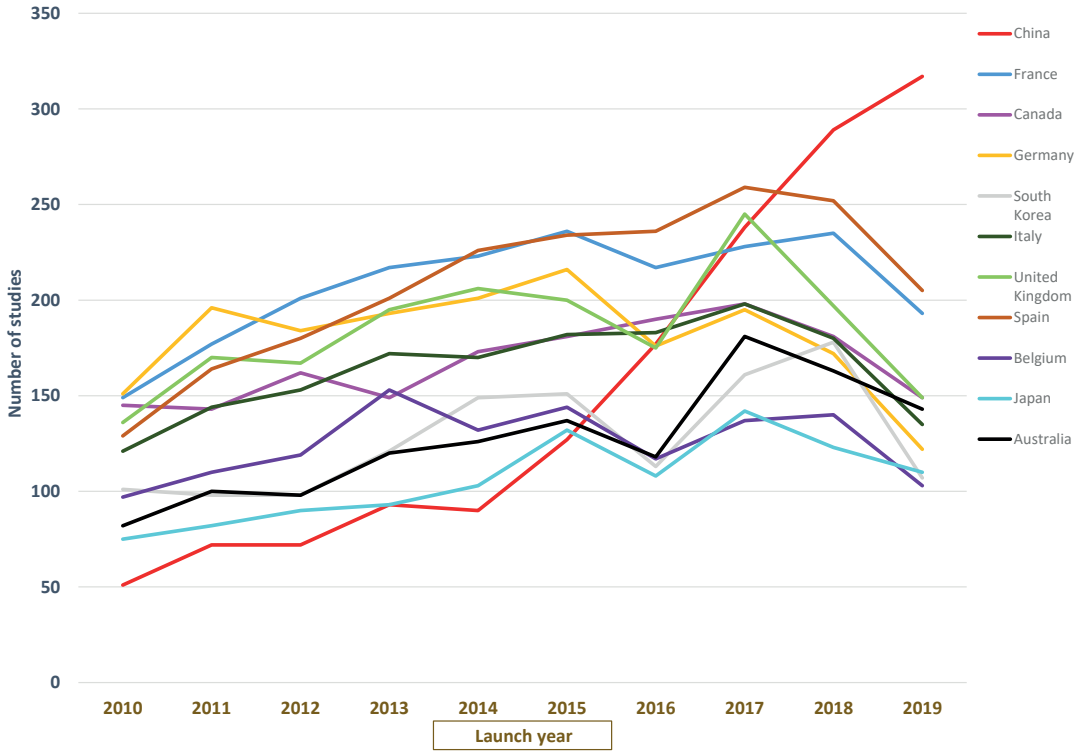


Figure 12 - Evolution of the top 10 "investigator" countries worldwide (excluding the United States) according to the number of interventional studies on cancer with exclusively industrial funding.

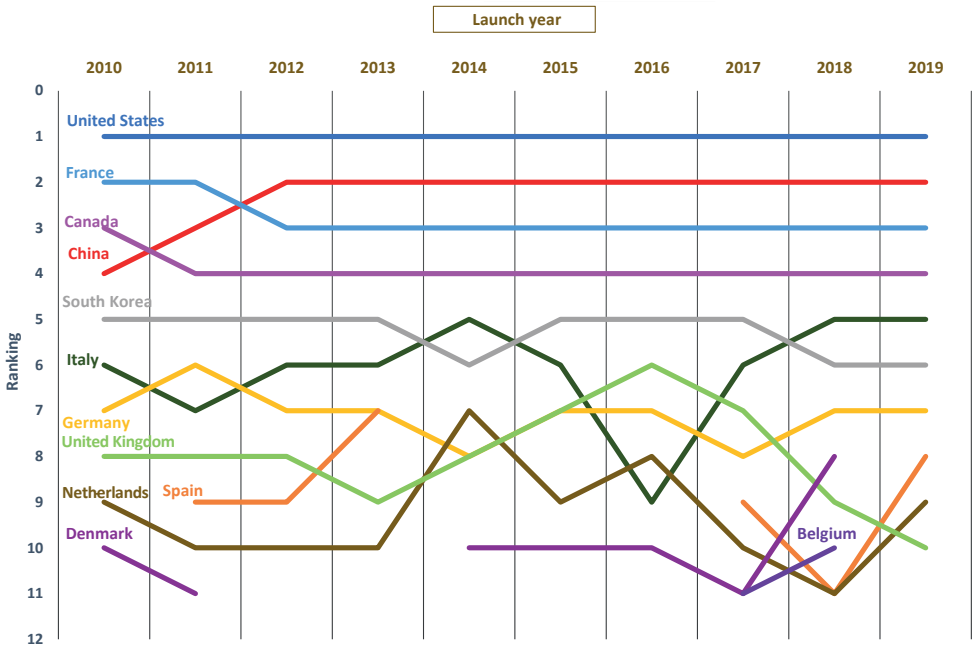


Figure 13 - Ranking of the top 10 "investigator" countries worldwide according to the number of interventional studies on cancer with non-industrial funding.

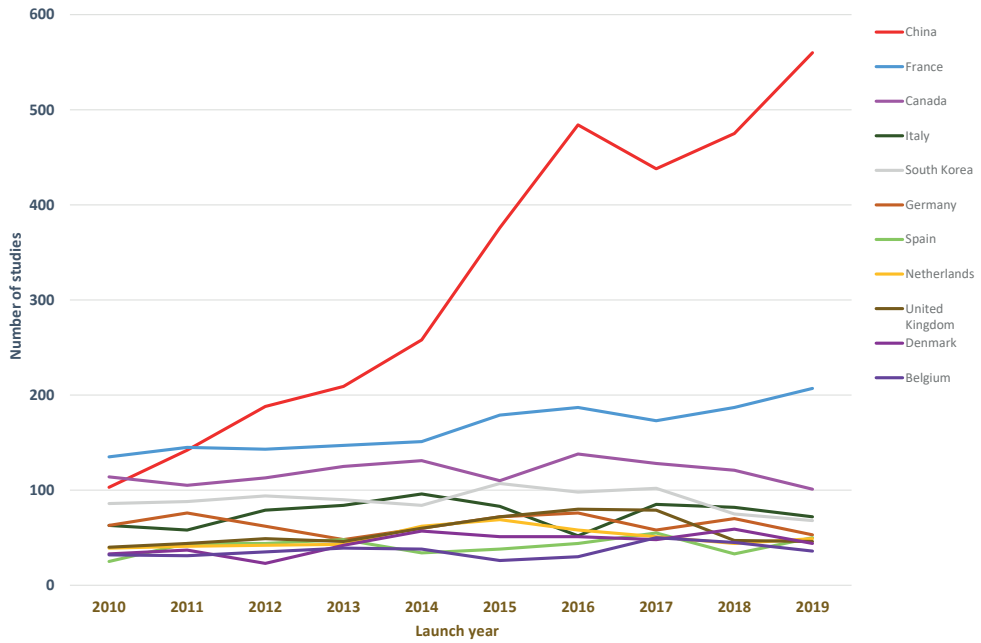


Figure 14 - Evolution of the top 10 "investigator" countries worldwide (excluding the United States) according to the number of interventional studies on cancer with non-industrial funding.

Figure 13 & Figure 14, which exclude the United States, show the number of interventional studies on cancer with non-industrial funding: in this area, France demonstrates an upward trend that is greater than that of many other countries. It has thus held 3rd place since 2012, behind the United States and China. This demonstrates the high proportion of studies carried out by public institutions (Healthcare Establishments, Cooperative Groups, etc.). It should also be noted that the registration of studies on ClinicalTrials.gov by Healthcare Establishments in France is recent, which may, among other things, partly explain this development. This situation is certainly not specific to France and the tendency to register studies on ClinicalTrials may vary depending on the country, especially during the first period. Current ICMJE requirements make registration mandatory.

Figure 13 also shows that the top 4 countries have not changed since 2012, but that from the 5th place onward, the number of studies per country remains close, which leads to fluctuating positions.

Unfortunately, we do not have the financial data to correlate these positions with the financial efforts made by the various countries.

D

France's positioning in Europe: interventional studies and types of funding

At the European level, France is in the lead in terms of the number of interventional studies on cancer, with a significant difference compared to other countries [**Figure 15 & Figure 16**].

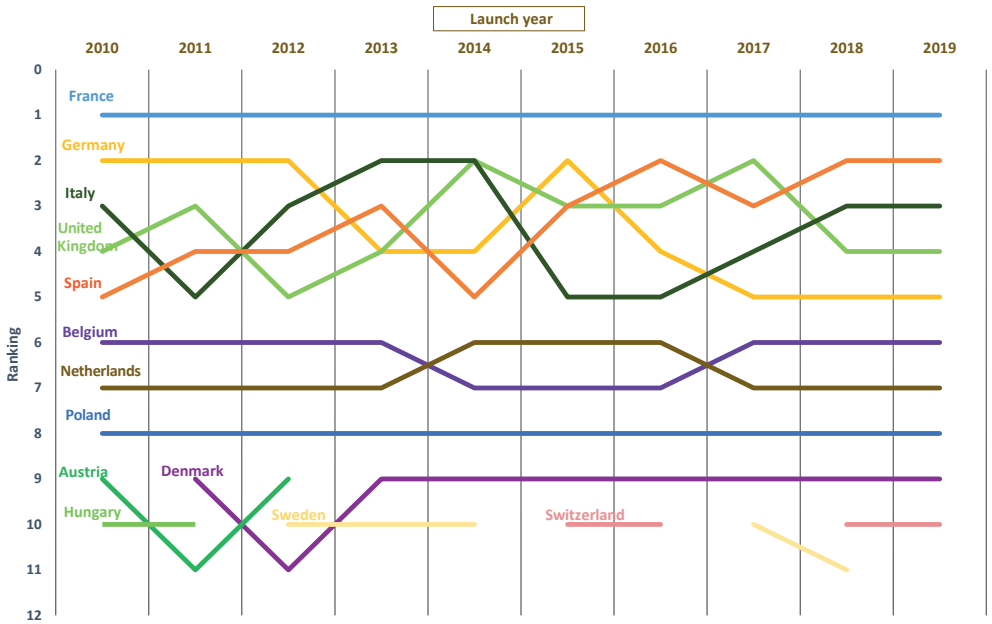


Figure 15 - Ranking of the top 10 "investigator" countries in Europe according to the number of interventional studies on cancer, all funding combined.

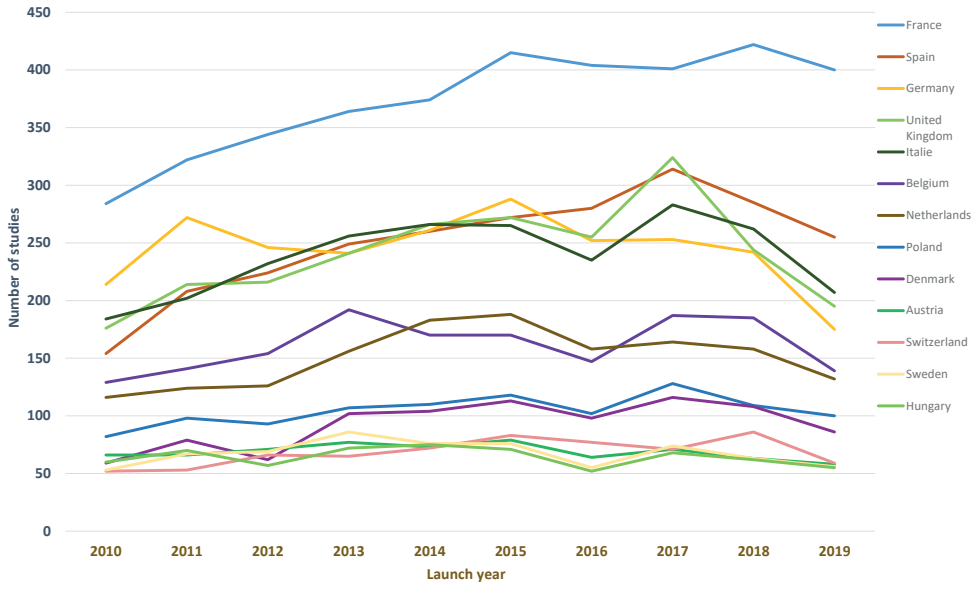


Figure 16 - Evolution of the top 10 "investigator" countries in Europe according to the number of interventional studies on cancer, all funding combined.

Regarding interventional studies with exclusively industrial funding, France and Spain are in close competition for first place, with Spain having strongly progressed since 2014 [**Figure 17 & Figure 18**].

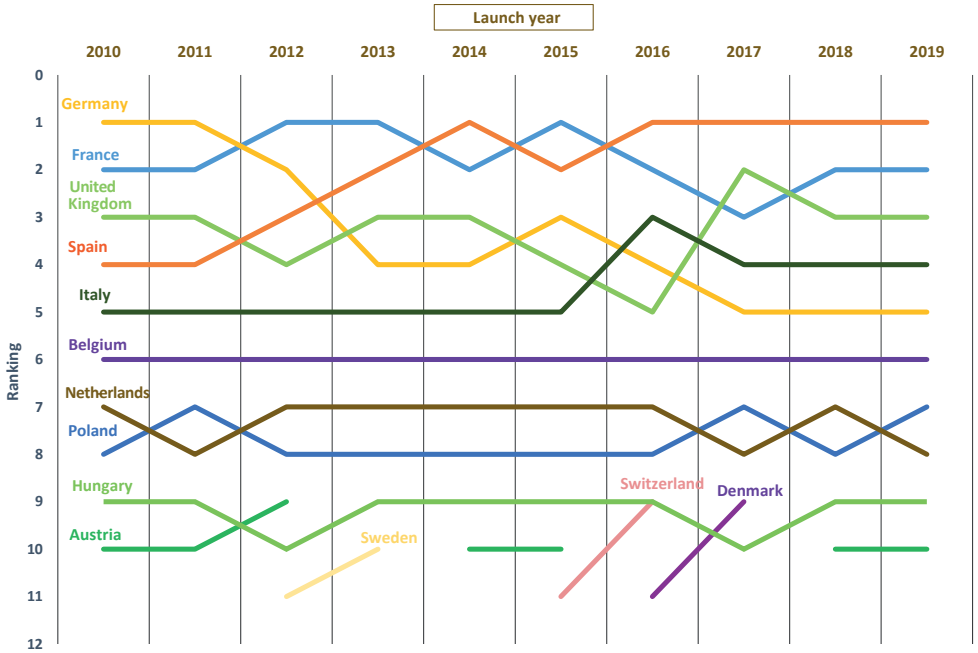


Figure 17 - Ranking of the top 10 "investigator" countries in Europe according to the number of interventional studies on cancer with industrial funding.

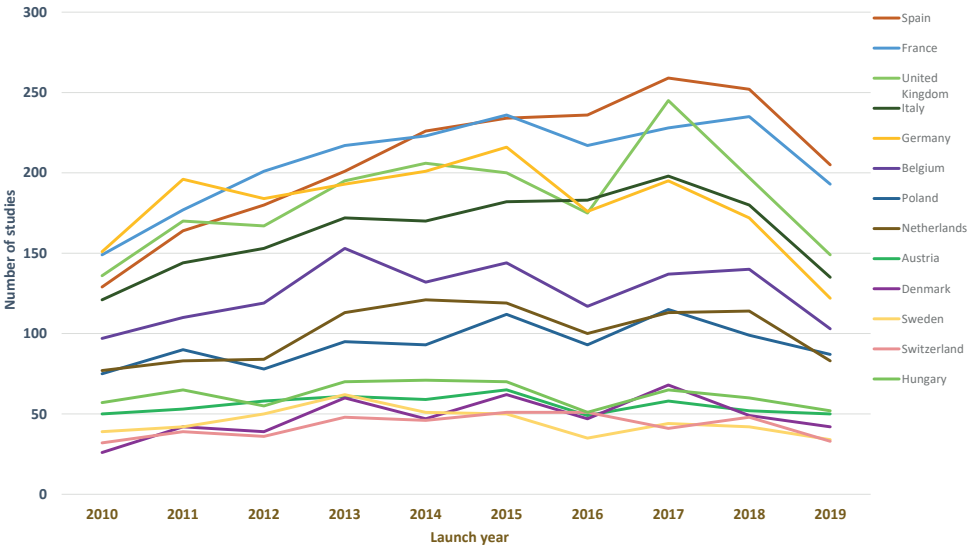


Figure 18 - Evolution of the top 10 "investigator" countries in Europe according to the number of interventional studies on cancer with non-industrial funding.

France's previously observed position therefore comes from the large number of studies not sponsored by industrialists: Healthcare Establishments, Cooperative Groups, etc. The European ranking of interventional studies on cancer with non-industrial funding [**Figure 19 & Figure 20**] confirms this hypothesis by placing France in 1st position over the entire period, with twice as many studies as Italy, often positioned second in Europe.

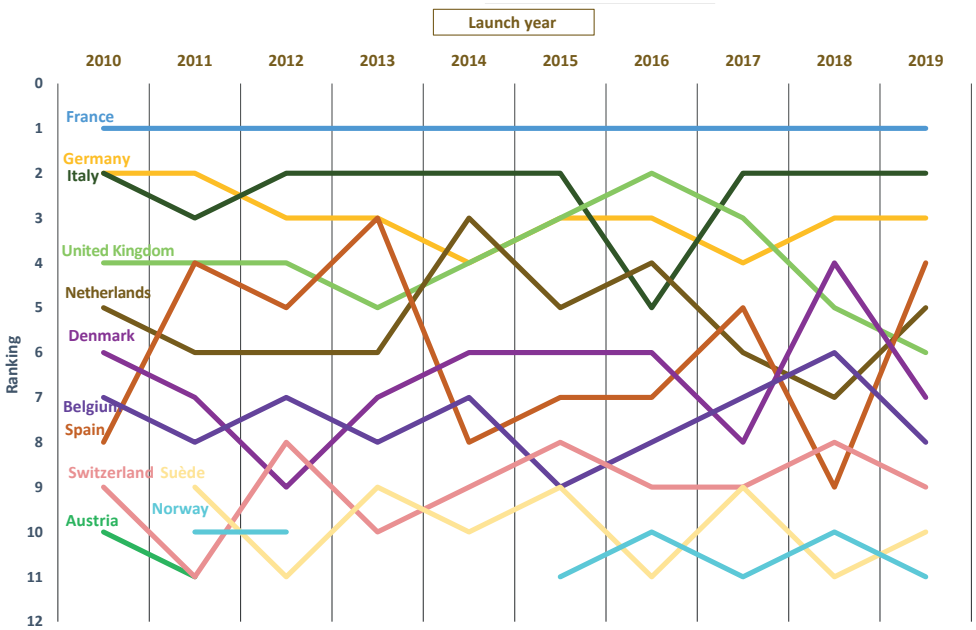


Figure 19 - Ranking of the top 10 "investigator" countries in Europe according to the number of interventional studies on cancer with non-industrial funding.

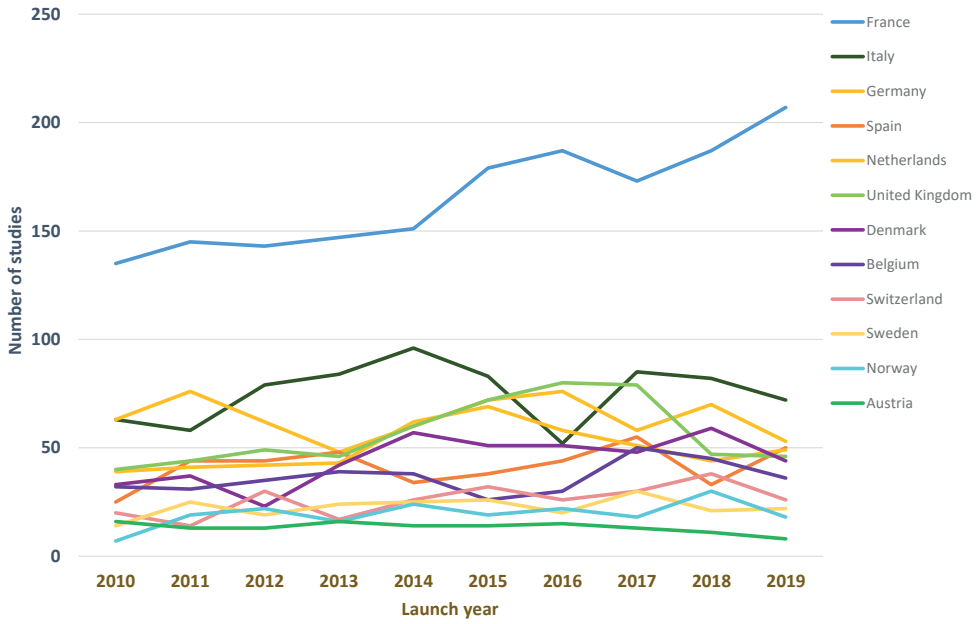


Figure 20 - Evolution of the top 10 "investigator" countries in Europe according to the number of interventional studies on cancer with non-industrial funding.

E

Sponsors of open studies in France - Place of Healthcare Establishments

The previous analysis showed the importance of academically funded interventional studies in France, lending it 3rd place worldwide and 1st in Europe. This is why we focused on these studies and, more notably, on their sponsors.

Figure 21 shows that the sponsorship of cancer clinical studies in France is ensured by CHU/CH for 27%, and by CLCC for 20%, with 42% being sponsored by industrialists. 9% of studies are sponsored by an academic institution: for example, INSERM (French National Health and Medical Research Body), cooperative groups in oncology, or learned societies. Figure 22 provides details on the 4,637 open studies in France between 2010 and 2019, distinguishing between interventional and observational studies and the type of sponsor. CHU/CH evidently represent a large number of observational studies (502/1,230). This is not the case for CLCC-sponsored studies, and even less so for those with industrial sponsors. It should be noted that CHU have set up numerous registries or clinico-biological databases, which could explain the high number of observational studies registered by CHU on ClinicalTrials.

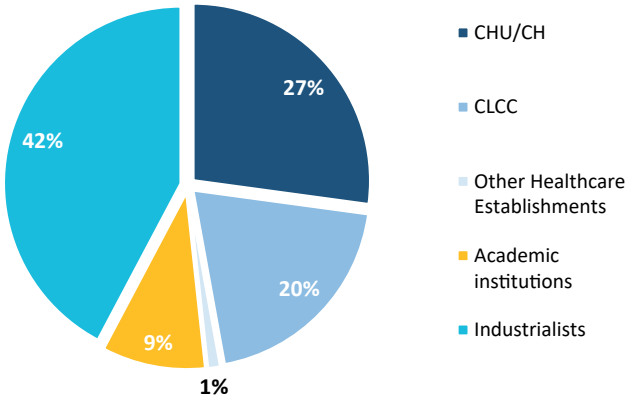


Figure 21 - Percentage of studies on cancer in France from 2010 to 2019.

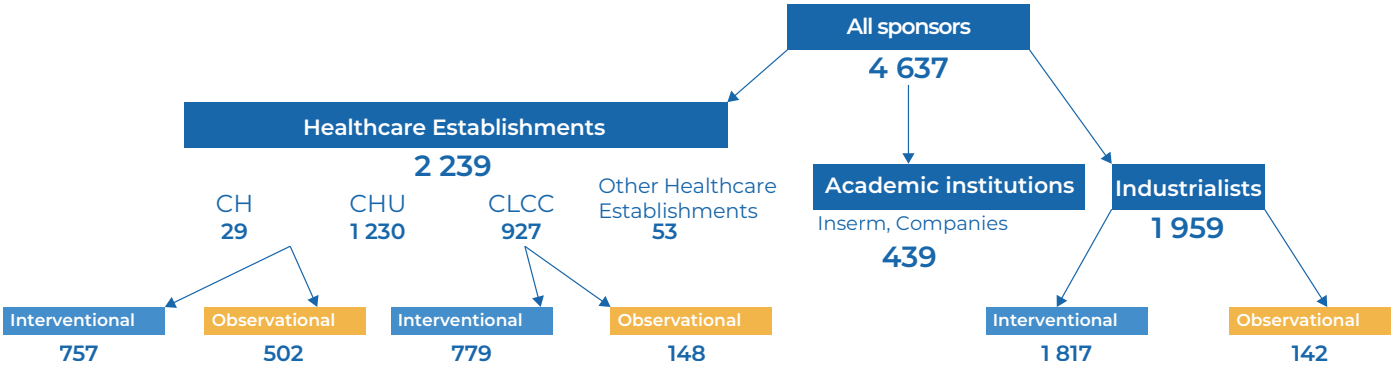


Figure 22 - Distribution of studies on cancer in France by sponsor, from 2010 to 2019.

Figure 23 provides details of the sponsors for interventional studies on cancer: 20% of studies are sponsored by CHU/CH, and 21% by CLCC, with industrial sponsors representing around 50% of studies.

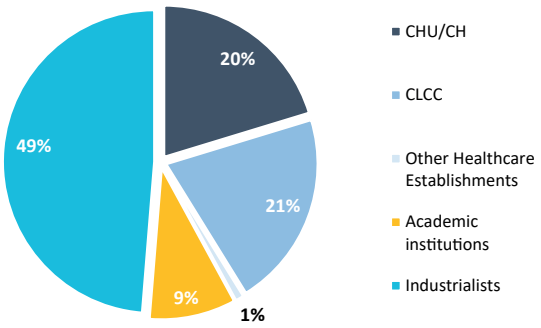


Figure 23 - Distribution of interventional studies on cancer in France from 2010 to 2019.

For more information:
Cancer Sheet
Breast

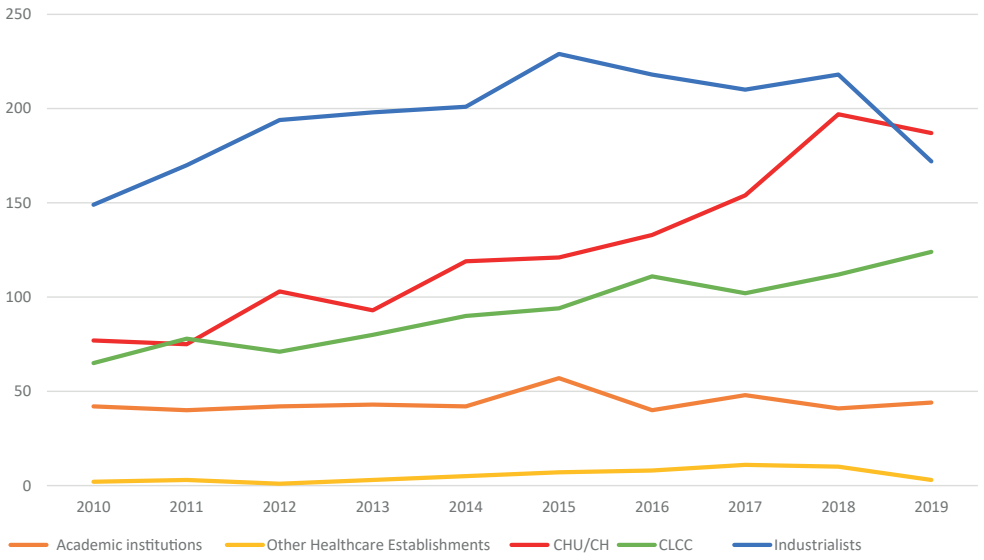


Figure 24 - Evolution of the number of studies on cancer in France according to their sponsor, from 2010 to 2019.

Figure 24 shows that the number of studies registered on ClinicalTrials by CHU/CH or CLCC has increased significantly over 10 years. This reflects an increase in the number of open studies, but also a better rate of registration of studies on ClinicalTrials, which has become mandatory for all projects funded by a DGOS (French Directorate General of Healthcare Provision) call for projects, for example.

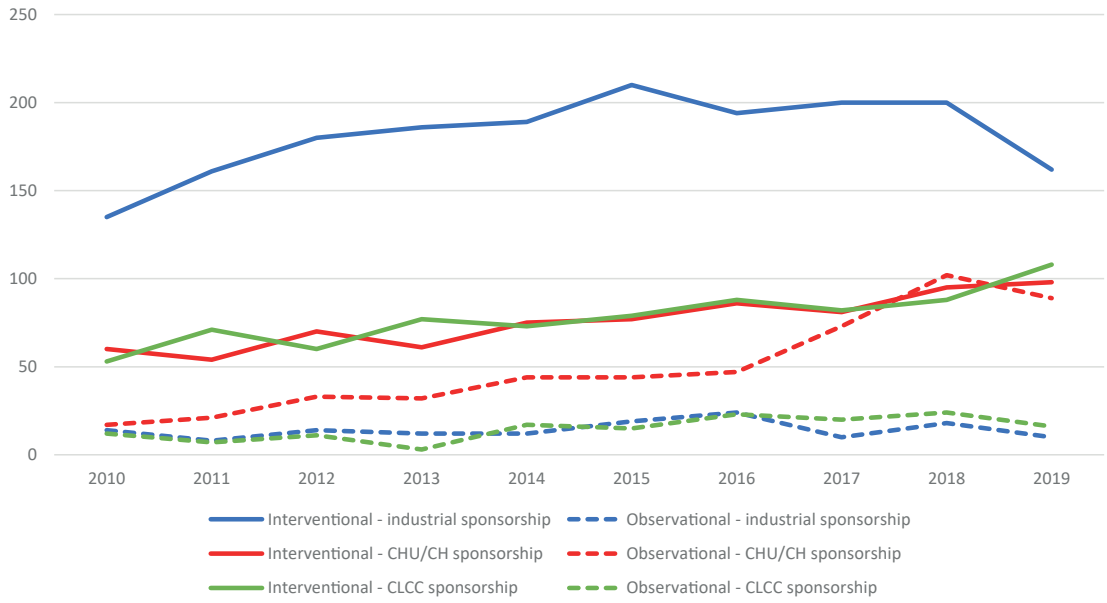


Figure 25 - Evolution of the number of studies on cancer in France according to their sponsor, from 2010 to 2019.

Figure 25 presents the number of studies registered on ClinicalTrials from 2010 to 2019, separating the 3 main types of sponsors: industrial, CHU/CH, and CLCC. A distinction is also made between interventional and observational studies. The numbers of interventional studies sponsored by CHU/CH and CLCC show an almost identical evolution. There is also a sharp increase in observational studies (as defined by ClinicalTrials) sponsored by CHU/CH.

F

Analysis by cancer site

France is notably highly ranked on the global scale for interventional studies on cancer (3rd place worldwide) with participation in approximately 10% of studies. We then sought to discover whether these studies concerned liquid or solid tumors, as well as the cancer sites concerned by these studies. The data analyzed relate to interventional studies and are presented according to 2 periods of 5 years each, with France's ranking on both European and global scales.

On the global scale, for the 2 periods from 2010 to 2014 and from 2015 to 2019, the 5 main types are: hematology, breast cancer, lung cancer, colorectal cancer, and skin cancer. The worldwide evolution over these 2 periods for the first 4 types of cancer is more pronounced than that in France, with an increase of 67% for lung cancer and 44% for breast cancer [Table 7].

Number of interventional studies on cancer, all funding combined											
	2010-2014				2015-2019				Evol.		
Site/Type	World-wide	France	Worldwide ranking	European ranking	World-wide	France	Worldwide ranking	European ranking	World-wide	France	Diff.
Hematology	2,808	392	2	1	3,510	385	3	1	3,510	385	3
Breast	1,808	215	2	1	2,595	250	3	1	2,595	250	3
Lung	1,335	149	3	1	2,227	235	3	1	2,227	235	3
Colorectal	1,175	115	3	1	1,510	136	3	1	1,510	136	3
Skin	960	102	3	2	1,116	120	2	1	1,116	120	2
Prostate	945	94	3	1	1,209	90	3	1	1,209	90	3
Head and Neck	621	63	3	1	947	87	3	1	947	87	3
Brain	733	73	3	1	1,009	77	3	1	1,009	77	3
Liver	571	56	4	1	768	62	4	1	768	62	4
Kidney	341	38	3	1	403	59	2	1	403	59	2
Stomach and Esophageal	632	34	10	5	976	55	4	1	976	55	4
Pancreatic	554	33	3	2	772	51	3	1	772	51	3
Ovarian	534	46	3	2	679	50	4	1	679	50	4
Bladder	182	15	2	1	419	45	3	2	419	45	3
Uterine	440	22	6	2	618	43	3	1	618	43	3
Bone	211	19	3	1	266	26	2	1	266	26	2
Thyroid	183	28	2	1	208	26	3	1	208	26	3
Testicular	48	5	2	1	32	1	12	9	32	1	12

Table 7 - Comparison of the main cancer sites, worldwide vs. France.

However, while the top 5 remains unchanged in France over these 2 periods of 5 years, we realize that the evolution is not the same. The number of interventional studies on hematology remained almost the same over the 2 periods, while that of lung cancer increased by approximately 58%. Breast, colorectal, and skin cancers increased by approximately 16% to 18% [Figure 26]. These differences in evolution are difficult to explain because, as we will see later, research efforts are not correlated with the epidemiology of the various cancers.

For more information:
Cancer Sheet
Lung

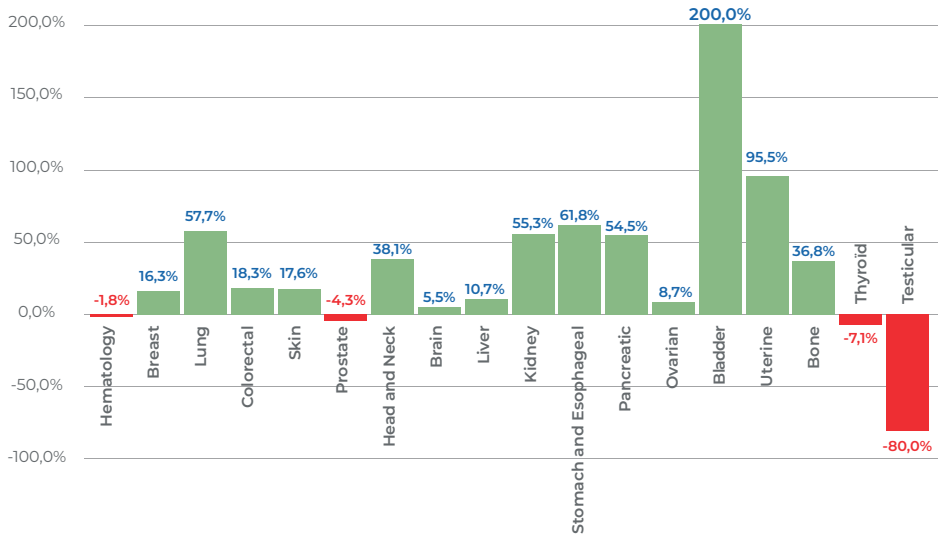


Figure 26 - Evolution of the number of interventional studies on cancer by cancer site (France, from 2010 to 2014 vs. 2015 to 2019).

The share of industrial funding remains almost the same over the 2 periods for the first 4 cancer sites. For example, hematology received 50% industrial funding across the 2 periods. The evolution in the number of studies with non-industrial funding is greater than that of industrial funding in the case of breast cancer (35% versus 48%) and colorectal cancer (22% versus 31%). Lung cancer has seen a very significant increase in the number of studies worldwide over these 2 periods, with a boost of 67% including a hike of 79% in the case of studies with industrial funding. It should also be noted that one of the weakest evolutions recorded in terms of the number of studies was for skin cancer, with 16%, due to very little evolution in studies with non-industrial funding (6%) but which nonetheless remains more significant in terms of volume from 2015 to 2019: 528 studies with industrial funding vs. 588 studies with non-industrial funding [Table 8].

Number of interventional studies on cancer worldwide by type of funding								
	2010-2014			2015-2019			Evol.	
Site/Type	Industrial	Non-industrial	Share of industrial funding	Industrial	Non-industrial	Share of industrial funding	Industrial	Non-industrial
Hematology	1,391	1,417	50%	1,753	1,757	50%	26.0%	24.0%
Breast	617	1,191	34%	832	1,763	32%	34.8%	48.0%
Lung	567	768	42%	1,014	1,213	46%	78.8%	57.9%
Colorectal	336	839	29%	411	1,099	27%	22.3%	31.0%
Skin	404	556	42%	528	588	47%	30.7%	5.8%
Prostate	357	588	38%	377	832	31%	5.6%	41.5%
Head and Neck	165	456	27%	282	665	30%	70.9%	45.8%
Brain	236	505	32%	300	717	29%	27.1%	42.0%
Liver	183	388	32%	239	529	31%	30.6%	36.3%
Kidney	148	193	43%	181	222	45%	22.3%	15.0%
Stomach and Esophageal	158	474	25%	289	687	30%	82.9%	44.9%
Pancreatic	184	370	33%	271	501	35%	47.3%	35.4%
Ovarian	189	345	35%	254	425	37%	34.4%	23.2%
Bladder	76	106	42%	204	215	49%	168.4%	102.8%
Uterine	117	323	27%	177	441	29%	51.3%	36.5%
Bone	57	154	27%	68	198	26%	19.3%	28.6%
Thyroid	68	115	37%	67	141	32%	-1.5%	22.6%
Testicular	10	38	21%	4	28	13%	-60.0%	-26.3%

Table 8 - Share of industrial funding in interventional studies on cancer worldwide - Detail by cancer site.

The previous results inform us that hematology, in terms of the volume of interventional studies, ranks first in the world and in France (6,318 worldwide studies and 777 studies in France), with an equivalent distribution between industrial and non-industrial funding (50%). In view of the importance of this type of cancer, **Table 9** focuses on 6 subgroups of hematology, which are: "acute myeloid leukemia", "chronic lymphoid leukemia", "diffuse large B-cell lymphoma", "follicular lymphoma", "multiple myeloma of the bones" and "myelodysplastic syndromes".

The 2 subgroups "acute myeloid leukemia" and "multiple myeloma of the bones" are the subject of the largest number of hematological interventional studies with, respectively, 752 and 659 studies worldwide and 79 and 74 studies in France, from 2015 to 2019.

Number of interventional studies on cancer, all funding combined											
	2010-2014				2015-2019				Evol.		
Hematology	World-wide	France	Worldwide ranking	European ranking	World-wide	France	Worldwide ranking	European ranking	World-wide	France	Diff.
Hematology - Global	2,808	392	2	1	3,510	385	3	1	25.0%	-1.8%	-26.8%
Acute myeloid leukemia	563	52	4	2	752	79	6	4	33.6%	51.9%	18.4%
Multiple myeloma of the bones	593	56	2	1	659	74	2	1	11.1%	32.1%	21.0%
Myelodysplastic syndromes	355	33	2	1	377	46	4	2	6.2%	39.4%	33.2%
Diffuse large B-cell lymphoma	236	29	2	1	340	32	2	1	44.1%	10.3%	-33.7%
Chronic lymphoid leukemia	337	45	2	1	352	26	4	3	4.5%	-42.2%	-46.7%
Follicular lymphoma	178	23	2	1	210	20	2	1	18.0%	-13.0%	-31.0%

Table 9 - Comparison of main hematological cancers, worldwide vs. France.

The evolution of the number of interventional studies for these last 2 hematological subgroups and for that of "myelodysplastic syndromes" is more important at France's level than at the global level, with an evolution of 52%, 32%, and 39% respectively [**Figure 28**]. However, for these 3 percentages of evolutions, it is also necessary to take into account the number of studies for which the count does not exceed 100 [**Table 9**].

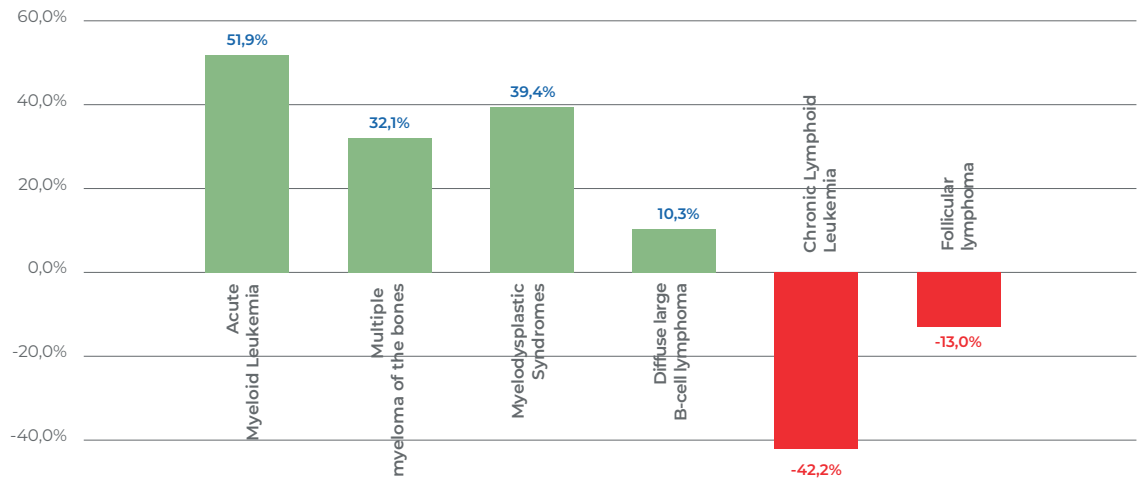
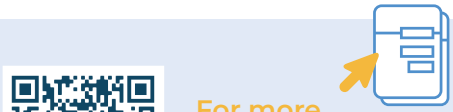


Figure 27 - Evolution of the 6 subgroups of hematological cancers (France, from 2010 to 2014 vs. 2015 to 2019).

From 2015 to 2019, interventional studies on "chronic lymphoid leukemia" and "multiple myeloma of the bones" were mainly funded by industrialists, with 59% of studies for the first and 57% of studies for the second [Table 10]. Conversely, interventional studies on "myelodysplastic syndromes"
and "acute myeloid leukemia" are those with less significant industrial funding with shares of 41% and 46% respectively.



Number of interventional studies on cancer, all funding combined								
	2010-2014			2015-2019			Evol.	
Hematology	Industrial	Non-industrial	Share of industrial funding	Industrial	Non-industrial	Share of industrial funding	Industrial	Non-industrial
Hematology - Global	1,417	1,391	50%	1,753	1,757	50%	23.7%	26.3%
Acute Myeloid Leukemia	236	327	42%	349	403	46%	47.9%	23.2%
Multiple Myeloma of the Bones	298	295	50%	373	286	57%	25.2%	-3.1%
Myelodysplastic Syndromes	145	210	41%	156	221	41%	7.6%	5.2%
Diffuse Large B-Cell Lymphoma	96	140	41%	166	174	49%	72.9%	24.3%
Chronic Lymphoid Leukemia	194	143	58%	206	146	59%	6.2%	2.1%
Follicular Lymphoma	74	104	42%	103	107	49%	39.2%	2.9%

Table 10 - Share of industrial funding in interventional studies on cancer (liquid tumors) worldwide - Detail by cancer site.

G

Analysis by age group: the specific case of pediatric oncology

A clinical study may concern one or more age groups among the following 3 classes: "Child", "Adult", and "Senior". Clinical studies on pediatric cancers are those that exclusively concern the "Child" age group; all studies with a combined age group – i.e., "Child" + "Adult" (2 age brackets) or "Child" + "Adult" + "Senior" (no specific age group) – are excluded. According to these criteria, there were 762 interventional and observational studies on pediatric cancer worldwide from 2010 to 2019, all funding combined [Figure 28].

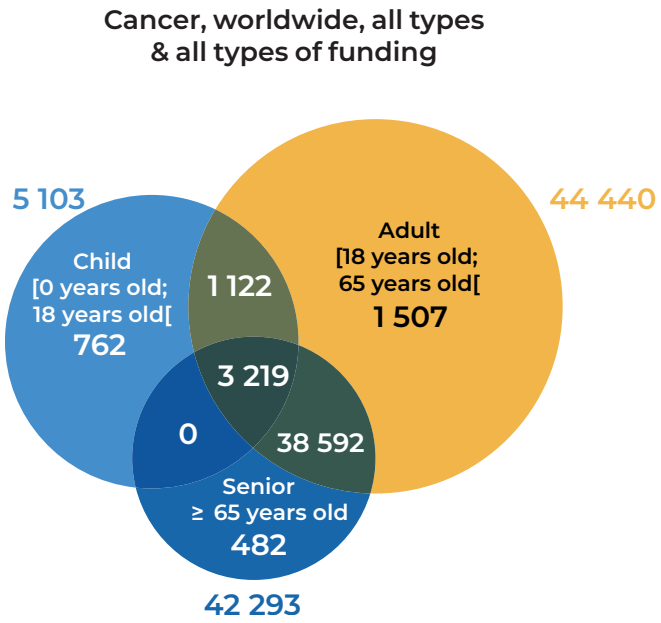


Figure 28 - Venn diagram of the distributions per age group of clinical studies on cancer worldwide, registered on ClinicalTrials.gov, from 2010 to 2019.

Studies on pediatric cancer thus represent 1.7% of cancer worldwide (762/45,684). In France, this number of studies is 111, which therefore suggests a slightly higher ratio with a representation of 2.4% of these studies on cancer (111/4,637). France participated in 1 out of 6 interventional studies on pediatric cancer worldwide (91/561) from 2010 to 2019. However, this rate changes considerably depending on the year, with a minimum of 6% participation in 2017 and a maximum of 26% in 2014 [Table 11].

Observational studies												
Theme	"Geographical scope"	Launch year										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL
"All types"	Worldwide	72	72	65	61	69	77	88	89	64	105	762
	France	10	10	9	12	15	12	8	7	9	19	111
	% France/Worldwide	**14%**	**14%**	**14%**	**20%**	**22%**	**16%**	**9%**	**8%**	**14%**	**18%**	**15%**
Interventional	Worldwide	53	46	46	53	50	63	64	69	44	73	561
	France	10	7	9	11	13	11	6	4	6	14	91
	% France/Worldwide	**19%**	**15%**	**20%**	**21%**	**26%**	**17%**	**9%**	**6%**	**14%**	**19%**	**16%**

Table 11 - Evolution of the number of studies on cancer per year: worldwide vs. France.

An analysis of the data provided by the ClinicalTrials database offers a global view of clinical study-related activity in a given field. It makes it possible to identify participating countries, sponsors, as well as sources of funding. It does not make it possible to analyze the number of inclusions made.

III Analysis of SIGREC data

A

The sponsorship of clinical studies is specific to Healthcare Establishments. In 2008, the French Ministry of Health therefore wanted to integrate indicators relating to clinical trials into the research funding model of these establishments (MERRI [Missions for Education, Research, Reference and Innovation] model [4]). The SIGAPS (System for the Identification, Management, and Analysis of Scientific Publications) system has therefore been supplemented with software designed to monitor clinical trials sponsored by Healthcare Establishments, known as SIGREC (System for the Identification and Management of Research and Clinical Trials). Its purpose is to monitor all the interventional research sponsored by Healthcare Establishments. The SIGAPS/SIGREC platform is currently installed in over 650 establishments, and notably in the Healthcare Establishments participating in sponsorship activities.

Each Healthcare Establishment must register the studies it sponsors on SIGREC. It must provide a certain amount of information: type of study, identifiers (ID-RCB [Biological Collection and Research], EudraCT, ClinicalTrials), methodology, dates, etc. It also provides information on the list of investigative centers, as well as the total annual inclusions, on a center-by-center basis. These data are sent twice a year (DGOS exports) to the SIGAPS/SIGREC Operational Unit, which uses them to calculate the indicators that determine MERRI credits for the various establishments.

SIGREC data therefore perfectly complement the data available in the ClinicalTrials.gov database.

The SIGREC analysis was carried out on the November 2020 export data.

Number of active studies			
Year	CHU/CH	CLCC	TOTAL
2010	**245**	230	476
2011	**264**	262	528
2012	**287**	288	578
2013	**290**	315	609
2014	**292**	333	632
2015	**282**	349	637
2016	**303**	370	677
2017	**287**	376	670
2018	**290**	405	702
2019	**298**	404	717
2010-2019	**966**	**1,043**	**2,037**

Table 12 - Active studies by sponsor.

Data relating to sponsorship activities

The first step of the analysis was to count the number of studies, from 2010 to 2019, and year by year. Since clinical studies are carried out over several years, a distinction is made between active studies and new studies. An active study is a study with an inclusion of patients: for example, a study that included patients in 2015, 2016, and 2017 will be considered as active over these 3 years. A new study is a study that has received medical and regulatory authorizations, and can therefore be launched. The year in which it was registered with the authorities is considered the authorization year. The number of active studies and the number of authorized studies therefore differ each year: a study with inclusion in 2010 may have been authorized in 2007 and conversely, a study authorized in 2012 may very well start its inclusions in 2014.

We identified 2,037 active interventional studies on cancer from 2010 to 2019 vs. 10,835 active interventional studies across all categories over this same period, i.e., 1 in 5 active studies relating to cancer. Among these 2,037 active interventional studies,

1,641 were authorized over the same period. 860 (52.4%) of these studies were sponsored by CLCC; 711 (43.3%) by CHU, 43 (2.6%) by a Hospital Center, and 27 (2.2%) by another sponsor (Clinic or EBNL [non-profit organization]). Almost 100% of the studies sponsored by CLCC are on cancer, while these represent only 10% of active studies sponsored by CHU/CH.

These figures are consistent with the analysis of ClinicalTrials data, which show equivalent sponsorship activities between CHU and CLCC insofar as interventional research is concerned. It is important to note, however, that the definitions of interventional and observational studies are not identical on ClinicalTrials and SIGREC, which may explain the slightly different data (See "Methodology", at the end of the report).

Table 12 and Figure 29 provide the number of active studies per year, separating studies sponsored by CHU or CH, and those sponsored by CLCC.

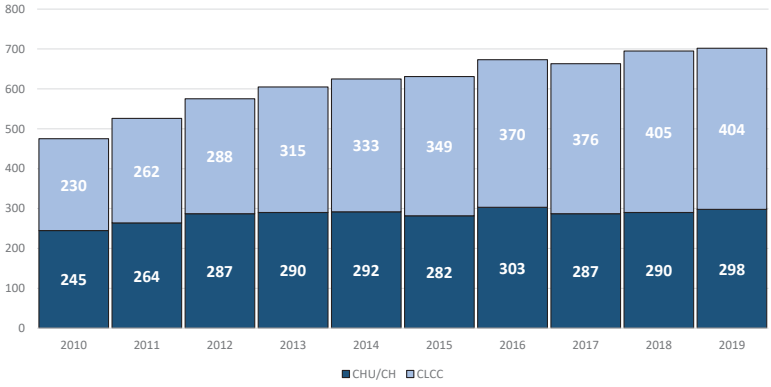


Figure 29 - Active studies by sponsor.

In 10 years, the number of studies has risen from 476 to 717, i.e., an increase of 50%. The queue of active studies is stable for CHU/CH, and has increased dramatically for CLCC. Relative stability has been observed over the past 4 years, with around 300 active studies per year for CHU/CH and 400 for CLCC.

Among the 2,037 active studies from 2010 to 2019, 1,690 (83.0%) were registered as RBM (Biomedical Research) or RIPH1 (Research Involving Human Subjects - Interventional studies), 187 (9.2%) as RIPH2 (Research Involving Human Subjects - Interventional studies with minimal risks and constraints) and 160 (7.9%) as routine care [**Figure 30**]. This distribution is similar between CHU/CH and CLCC. The percentage of RBM/RIPH1 studies is higher in oncology than for all studies combined (75%).

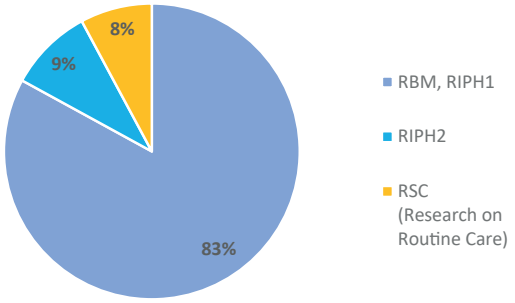


Figure 30 - Distribution by type of research.

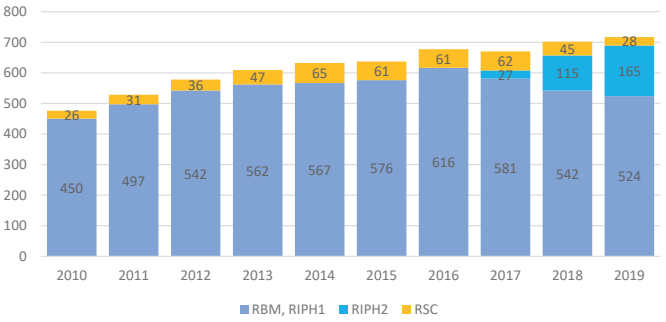


Figure 31 - Evolution of the types of research.

Figure 31 shows a gradual increase in RIPH2-type studies. This result is explained by the fact that many studies classified as RBM under the previous regulations are now registered as RIPH, and many studies classified as RBM under the previous regulation are coming to an end. The number of RBM studies will soon approach 0, and the exact proportions of RIPH1 and RIPH2 will be easier to interpret.

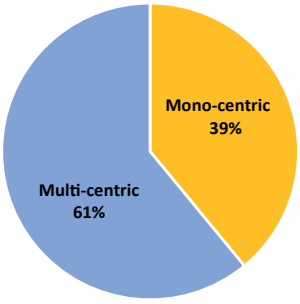


Figure 32 - Mono-/multi-centric distribution.

	Number of studies					
Number of centers with at least 1 inclusion	CHU/ CH	Share	CLCC	Share	**TOTAL***	**Share**
1 center	398	41.2%	373	35.8%	**795**	**39.0%**
2 to 5 centers	237	24.5%	283	27.1%	**522**	**25.6%**
6 to 10 centers	127	13.1%	153	14.7%	**282**	**13.8%**
11 to 20 centers	111	11.5%	137	13.1%	**248**	**12.2%**
21 centers and more	93	9.6%	97	9.3%	**190**	**9.3%**
	966		**1,043**		**2,037**	

Table 13 - Distribution by number of recruitment centers.

Figure 32 shows that 60% of studies on cancer are multi-centric, while this rate is 40% for all categories combined. These data reflect the high level of networking in oncology research.

Around 25% of studies involve 2 to 5 recruitment centers; 14% between 6 and 10 centers; and 22% more than 10 centers [**Table 13**].

Of the 2,037 studies analyzed, 742 (36.4%) relate to drugs. The very high rate of Phase I/II studies should also be noted: 507/2,037 (24.9%) with regard to oncology, while the percentage of Phase I/II for all categories combined is around 8.7%.

There are also numerous studies on chemotherapy and/or radiotherapy. 49% of studies focus on therapeutic developments, 14% on diagnostic developments, and 8% on physio-pathological developments.

Among the 2,037 studies, 564 (27.7%) received funding in the context of a DGOS call for projects. This figure is similar to the DGOS funding rates for all categories combined (around 30%). Among the 564 funded studies, 295 were sponsored by CHU/CH, and 269 by CLCC.

Table 14 & Figure 33 show a year-by-year breakdown of the number of active studies with and without DGOS funding. The number of studies with DGOS funding has notably remained stable, at around 200 per year. As the number of active studies has increased sharply over 10 years, the percentage of studies with DGOS funding has de facto increased from 43% in 2010 to 28% in 2019.

For more information:
Cancer Sheet
Colorectal

Number of active studies			
"Year of inclusion"	DGOS	Non-DGOS	TOTAL
2010	**205**	271	476
2011	**215**	313	528
2012	**227**	351	578
2013	**226**	383	609
2014	**206**	426	632
2015	**203**	434	637
2016	**196**	481	677
2017	**185**	485	670
2018	**187**	515	702
2019	**204**	513	717
2010-2019	**564**	**1,473**	**2,037**

Table 14 - DGOS funding.

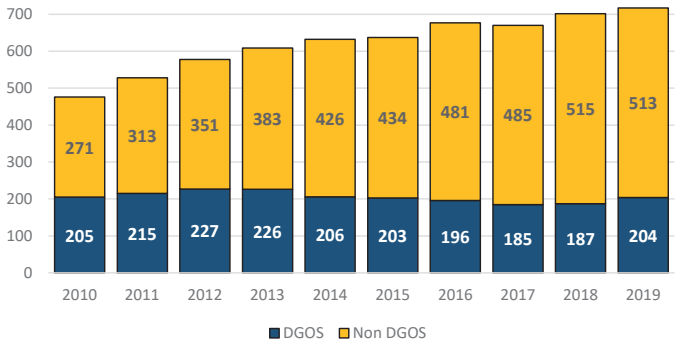


Figure 33 - DGOS funding.

	Amount (in euros)				Share (in percentage)		
Year of call for projects	CHU	CLCC	CH/EBNL	**TOTAL**	CHU	CLCC	CH/EBNL
2012	11,974,433	11,911,312	242,000	**24,127,745**	49.6	49.4	1.0
2013	14,261,108	8.049.173		**22,310,281**	63.9	36.1	0.0
2014	12,755,389	10,811,947	649,993	**24,217,330**	52.7	44.6	2.7
2015	11,222,829	13,237,273		**24,460,102**	45.9	54.1	0.0
2016	12,699,144	10,483,533		**23,182,677**	54.8	45.2	0.0
2017	13,068,970	11,644,691		**24,713,661**	52.9	47.1	0.0
2018	11,508,481	11,869,692	1,017,335	**24,395,508**	47.2	48.7	4.2
2019	11,094,313	13,177,191		**24,271,504**	45.7	54.3	0.0
2012-2019	**98,584,668**	**91,184,812**	**1,909,328**	**191,678,808**	**51.4**	**47.6**	**1.0**

Table 15 - Amounts corresponding to DGOS calls for projects on cancer (source: DGOS).

Table 15 shows, from 2012 to 2019, the amounts allocated to different types of Healthcare Establishments. The annual amount comes to around €24M, or around €240M over 10 years if we interpolate. There is an almost balanced distribution between CHU and CLCC. There are many other sources of funding (Cancer Leagues, Cancer Research Associations, Patient Associations, etc.) but the data are difficult to collect.

B

Data relating to inclusions

1. Analysis of "sponsor" inclusions

From 2010 to 2019, the 2,037 active studies allowed for the inclusion of approximately 314,000 patients. Table 16 provides the number of inclusions per year, all studies on cancer combined and for Phase I/II studies on cancer. The number of inclusions remained more or less constant, while the number of active studies has increased. Among the active studies, there are studies with large volumes of inclusions: 1,000, 5,000, or even 10,000 patients. These studies have a strong impact on annual totals. Phase I/II studies represent 1 in 4 studies but only 8.9% of inclusions, which is logical as they generally include few patients.

	Studies - All Phases combined		Phase I & II studies		Share of active Phase I & II studies
Year of inclusion	Number of active studies	Number of inclusions	Number of active studies	Number of inclusions	
2010	476	31,044	135	2,207	28.4%
2011	528	25,729	147	2,196	27.8%
2012	578	30,858	151	2,897	26.1%
2013	609	29,576	149	2,738	24.5%
2014	632	28,481	151	2,814	23.9%
2015	637	30,689	148	2,578	23.2%
2016	677	29,316	154	2,692	22.7%
2017	670	48,027	145	2,885	21.6%
2018	702	29,917	157	3,235	22.4%
2019	717	30,159	181	3,647	25.2%
2010-2019	**2,037**	**313,796**	**507**	**27,889**	**24.9%**

Table 16 - Inclusions by year.

Table 17 provides the description of inclusions by year. As had already been observed in the "CHU sponsorship" report, the inclusion indicators are surprisingly stable over the different years, with a first quartile at 6 (25% of studies include between 1 and 6 patients per year), a median at around 15, and a 90th percentile at around 100: this means that only 10% of studies include more than 100 patients per year. It is important to note the presence of studies that may have more than 1,000 inclusions per year.

	Distribution of active studies according to their number of inclusions per year								
Year of inclusion	N	Min.	Q1	Median	Q3	P90	P95	P99	Max.
2010	476	1	6	15	41.50	113.00	198.75	371.25	10,949
2011	528	1	6	15	41.25	102.30	170.95	440.90	4,160
2012	578	1	6	16	43.50	94.60	171.45	472.43	5,998
2013	609	1	6	16	39.00	87.20	162.60	636.28	2,482
2014	632	1	5	16	43.25	94.80	167.70	364.47	2,601
2015	637	1	5	14	40.00	103.40	172.40	378.56	3,612
2016	677	1	6	15	38.00	97.00	164.40	491.96	1,695
2017	670	1	5	16	40.00	94.10	189.20	492.61	12,000
2018	702	1	6	16	36.00	87.00	161.55	455.47	2,210
2019	717	1	5	14	38.00	81.40	154.20	460.84	2,171
2010-2019	**2,037**	**1**	**6**	**15**	**39.00**	**96.00**	**170.00**	**480.50**	**12,000**

Table 17 - Statistics on inclusions by year.

The 2 previous tables show a certain stability in the number of inclusions over the last 10 years, while one of the objectives of the various Cancer Plans was to increase the number of patients included in clinical trials. These results are more nuanced if all studies combined are distinguished from Phase I/II studies. Indeed, with regard to Phase I/II studies, an increase of approximately 50% can be observed over the 10-year period. We observe roughly the same results if we consider therapeutic studies, which represent 49% of studies: the figures jump from 268 active studies in 2010 to 372 in 2019 (+39%) and from 7,825 inclusions in 2010 to 10,196 inclusions in 2019 (+30%).

Table 17 also shows the existence of studies with a large volume of inclusions: for example, these may be studies based on clinico-biological databases. These studies, while important, may skew the patient volumes included in the studies. Inclusion volumes are therefore generally presented with and without these studies. To do so, for each year we calculate the percentiles for the number of inclusions and identify the studies that have a number of inclusions greater than the 99th percentile (P99). A more precise analysis of these studies shows that these 33 studies out of 2,037, or 1.6%, accumulate nearly 95,000 inclusions over 10 years, which is almost 30% of the total volume of inclusions. It is thus important to focus on these studies.

Among these studies, we find:

- Screening studies: for example, a trial evaluating the effectiveness of sending reminders via SMS for breast cancer screening (12,000 patients in one year), a screening strategy for malignant melanoma (4,300 patients), or the use of colonoscopy with instillation of blue water for the detection of adenomas (1,000 patients).
- Epidemiological studies: for example, a prospective multi-centric cohort of childhood and adolescent leukemia (4,000 patients, PHRC [Hospital Clinical Research Program]), or the constitution of a biological bank as part of a cohort of patients treated for childhood cancers (3,000 patients).
- Genetic studies: for example, evaluating the clinical usefulness of new gene mutations predisposing carriers to breast and ovarian cancer (4,500 patients), or the oligogenic determinism of colorectal cancer (1,600 patients).
- Physio-pathological studies: for example, the measurement and characterization of circulating endothelial cells in patients with metastatic cancer (2,000 patients).

Given the patient counts for these studies, it is easy to understand why they cannot be compared to other studies, and notably Phase I/II studies, which generally include less than 100 patients.

Table 18 & Table 19 show, on a year-by-year basis, the number of inclusions attained in interventional studies sponsored by CHU/CH or CLCC, all inclusion volumes combined or removing studies with a high inclusion volume (> P99). All inclusion volumes combined, the proportions of inclusions and active studies are comparable for these 2 types of sponsors over the entire period. The evolution over time, of both the number of active studies and the number of inclusions, however, is not comparable between CHU/CH and CLCC. **Table 18** shows that the number of studies sponsored by CHU barely increased between 2010 and 2019 (+22%) compared to CLCC-sponsored studies (+76%). **Table 19** shows inclusion volumes (excluding studies > P99) that stagnated or even decreased for CHU/CH whereas they increased by around 55% for CLCC.

	Number of active studies		Number of inclusions	
Year of inclusion	CHU/CH	CLCC	CHU/CH	CLCC
2010	245	230	21,643	9,395
2011	264	262	14,756	10,962
2012	287	288	17,666	13,132
2013	290	315	12,369	17,124
2014	292	333	9,899	18,326
2015	282	349	12,933	17,477
2016	303	370	11,516	17,562
2017	287	376	30,376	17,540
2018	290	405	10,691	19,105
2019	298	404	10,586	19,200
2010-2019	**966**	**1,043**	**152,435**	**159,823**

Table 18 - Detail of inclusions by sponsor.

	Number of active studies		Number of inclusions	
Year of inclusion	CHU/CH	CLCC	CHU/CH	CLCC
2010	242	228	9,733	8,245
2011	260	260	9,016	9,912
2012	284	285	9,868	10,606
2013	287	311	9,593	12,140
2014	291	327	9,299	12,942
2015	279	345	8,442	13,610
2016	300	366	9,433	14,043
2017	283	373	9,948	15,068
2018	289	398	9,927	13,302
2019	296	398	9,382	12,808
2010-2019			**94,641**	**122,676**

Table 19 - Detail of inclusions by sponsor, excluding studies > P99.

This difference is even more striking with regard to Phase I/II studies. **Table 20** shows, by year and by sponsor, the number of active studies and the number of inclusions for Phases I/II. The number of Phase I/II studies sponsored by CHU/CH tended to decrease between 2010 and 2019, as did the number of patients included. The opposite trend was observed for CLCC, which showed an increase of 72% in the number of active studies and an increase of 142% with regard to inclusions.

Finally, it is worth analyzing the number of patients included in studies funded through a DGOS call for projects. **Table 21** & **Figure 34** show, on a year-by-year basis, the number of inclusions attained in studies with or without DGOS funding. The number of studies with DGOS funding has been stable over the last 10 years, while the total number has increased.

This result is also reflected in the inclusions: the share of inclusions in studies with DGOS funding has fallen sharply: 50% in 2010 vs. 33% in 2019.

	Number of active studies		Number of inclusions	
Year of inclusion	CHU/CH	CLCC	CHU/CH	CLCC
2010	63	71	1,032	1,169
2011	65	81	1,010	1,176
2012	66	84	1,255	1,633
2013	58	90	838	1,895
2014	55	95	721	2,092
2015	52	96	618	1,960
2016	52	102	528	2,164
2017	42	103	471	2,414
2018	45	112	515	2,720
2019	59	122	816	2,831
2010-2019			**7,804**	**20,054**

Table 20 - Detail of inclusions by sponsor, Phases I/II.

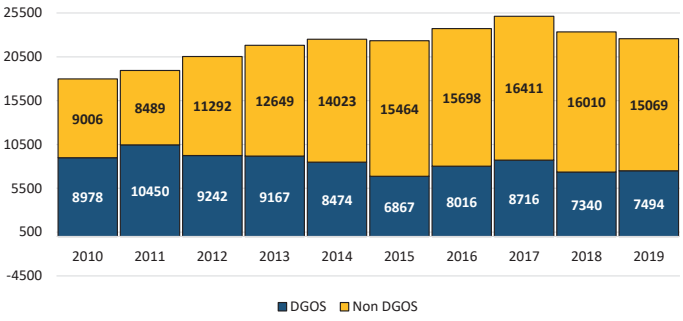


Figure 34 - Detail of inclusions with or without DGOS funding.

	Number of inclusions (< P99)		
Year of inclusion	DGOS	Non-DGOS	TOTAL
2010	8,978	9,006	17,984
2011	10,450	8,489	18,939
2012	9,242	11,292	20,534
2013	9,167	12,649	21,816
2014	8,474	14,023	22,497
2015	6,867	15,464	22,331
2016	8,016	15,698	23,714
2017	8,716	16,411	25,127
2018	7,340	16,010	23,350
2019	7,494	15,069	22,563
Total	**84,744**	**134,111**	**218,855**

Table 21 - Detail of inclusions with or without DGOS funding.

For more information:
Cancer Sheet
Prostate

2. Analysis of "investigator" inclusions

The previous analysis showed that approximately 314,000 patients have been included in studies on cancer over the past 10 years. Where were these patients included? In CHU? In CLCC? In CH? **Table 22** & **Figure 35** provide the detail of inclusions by type of Establishment.

Year of inclusion	CHU	CLCC	CH	CLINIC	EBNL	Non-MERRI	FDHS	TOTAL
2010	20,563	7,478	1,241	341	233	1,141	43	31,040
2011	9,170	9,315	1,442	339	221	5,168	42	25,697
2012	15,470	11,363	1,752	675	489	1,028	69	30,846
2013	10,542	14,627	1,870	790	613	1,065	52	29,559
2014	9,126	15,379	1,464	581	755	1,150	24	28,479
2015	13,074	13,846	1,334	596	619	1,169	45	30,683
2016	11,555	13,115	1,787	742	604	1,452	59	29,314
2017	21,810	13,964	2,014	715	408	9,037	79	48,027
2018	10,289	15,247	2,176	751	513	879	59	29,914
2019	9,899	14,103	2,463	684	863	2,061	62	30,135
2010-2019	**131,498**	**128,437**	**17,543**	**6,214**	**5,318**	**24,150**	**534**	**313,694**

Table 22 - Detail of inclusions by type of Establishment.

From 2010 to 2019, 41.9% of inclusions took place in CHU, 40.9% in CLCC. Next come Hospital Centers, which represent 5.6%, followed by private clinics (2.0%), and EBNL (1.7%). 7.7% of inclusions take place in institutions that are not referenced in the list of 650 Establishments equipped with SIGREC (Hospital Centers or clinics that are not equipped, or foreign centers).

Figure 36 shows the evolution of inclusions in CHU or CLCC, taking into account all inclusions (CHU and CLCC curves) or removing large studies with several thousand patients (CHU-P99 and CLCC-P99 curves). By removing high volume studies, the number of inclusions in CHU is relatively stable and close to 10,000 inclusions per year. Regarding inclusions in CLCC, there is an increase of approximately 80% between 2010-2011 and 2018-2019; an evolution similar to that observed for Phases I/II.

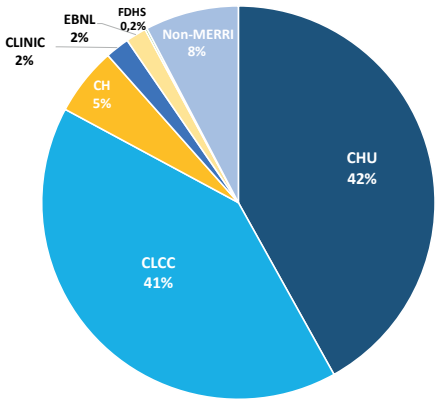


Figure 35 - Share of inclusions by type of Establishment.

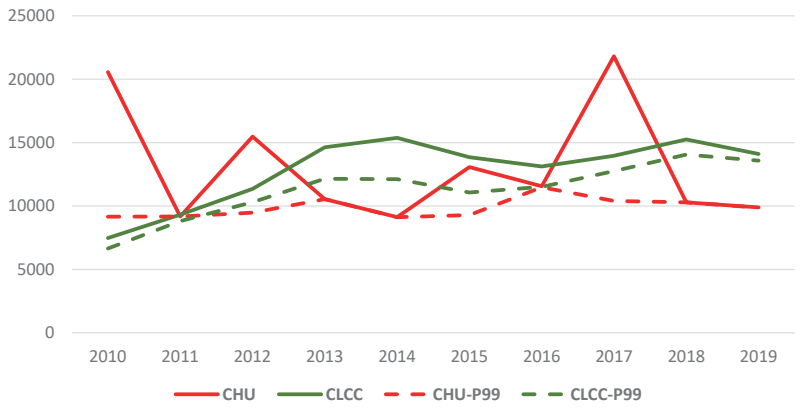


Figure 36 - Evolution of inclusions in CHU and CLCC.

Figure 37 shows the evolution of inclusions attained by Hospital Centers, private clinics, and EBNL. Note the significant evolution in inclusions in CH, which represented between 4% and 6% until 2017, but which represented 8.2% of the inclusions in 2019 across all active studies sponsored by a Healthcare Establishment. There are around 100 Hospital Centers involved, with 1 to 100 active studies over the period considered, and a total number of inclusions close to 4,000 for the most active. The median number of inclusions in studies on cancer is 80, which means that half of the CH that participated in these studies included more than 80 patients over the past 10 years.

It should be noted that the SIGREC database mostly lists interventional studies; only observational studies that have received DGOS funding are also listed. However, the analysis of ClinicalTrials data had shown (**Figure 25**) that over the last 3 years (2017, 2018, and 2019), CHU have registered as many observational studies as interventional studies on ClinicalTrials. As the analysis of inclusions was carried out on interventional studies, inclusions in observational studies are therefore not accounted for in this analysis.

There were 183 active observational studies on SIGREC from 2010 to 2019, including 135 initiated by CHU.

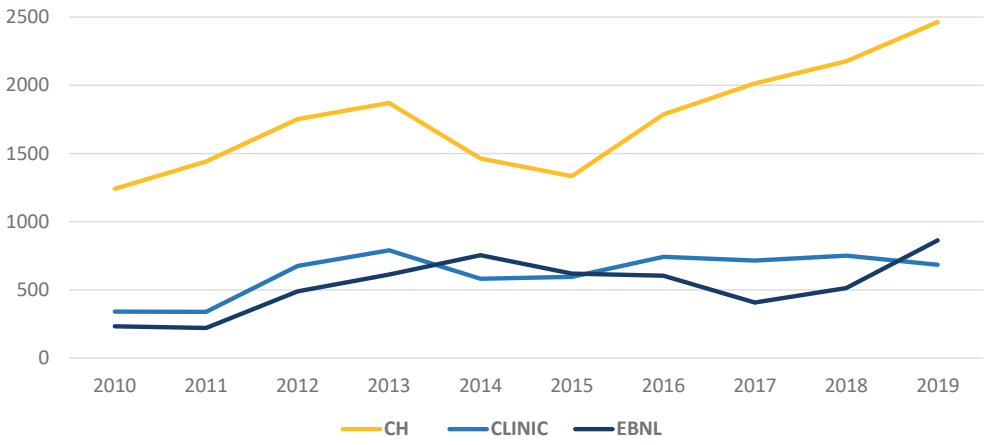


Figure 37 - Evolution of inclusions in CH, Clinics, and EBNL.

Analysis of these studies shows a total inclusion volume of 109,000, over 100,000 of which were for studies initiated by CHU. These studies are essentially epidemiological, diagnostic, or preventive studies. There are also Human and Social Sciences-based studies. These studies aim to better understand diseases, monitor patients' conditions, and prevent relapses. They reflect the positioning of CHU, between basic research, clinical research, and patient care.

For more information:
Cancer Sheet
Liver

For more information:
Cancer Sheet
Head & Neck

3. Analysis by region: a highly disparate situation

In SIGREC, investigator centers are identified by their FINESS number, the first 2 digits of which correspond to the French department number. It is therefore possible to observe, by region across the 2 periods:

- The total number of inclusions, for all pathologies combined;
- The total number of inclusions in studies on cancer.

These figures can also be weighted against population data [5] to find out whether, compared to the population, the numbers of patients included in trials are substantially the same for each region. To do this, and to avoid skewing the data through studies involving several thousand patients, we excluded studies with cumulative inclusions greater than the 99th percentile (P99) for studies on cancer and all categories combined.

	2019 - Nb. of studies led by Professors and Assistant Professors / Hospital Practitioners (PU-PH - MCU-PH)		Number of inclusions in studies on cancer (<P99)		Total number of inclusions (<P99)		Inclusions in studies on cancer / Total inclusions		Inclusions in studies on cancer / 100,000 inhabitants	
Region	Number	"Ratio /100,000 inhab."	2010-2014	2015-2019	2010-2014	2015-2019	2010-2014	2015-2019	2010-2014	2015-2019
Auvergne-Rhône-Alpes	758	9.5	17,722	21,077	81,881	120,532	21.6	17.5	228.5	263.8
Bourgogne-Franche-Comté	205	7.3	4,780	7,120	31,258	31,822	15.3	22.4	169.6	253.7
Brittany	259	7.8	4,379	5,107	30,206	65,658	14.5	7.8	134.5	153.2
Centre-Val de Loire	125	4.9	2,199	1,722	10,794	15,691	20.4	11.0	85.6	66.9
Grand Est	548	9.9	7,496	8,416	35,247	50,316	21.3	16.7	135.0	151.7
Hauts-de-France	361	6.0	6,188	7,820	66,270	59,500	9.3	13.1	103.3	130.3
Île-de-France	1,859	15.2	26,159	29,611	148,609	222,160	17.6	13.3	218.6	242.5
Normandy	203	6.1	7,660	6,622	25,787	25,867	29.7	25.6	230.2	199.1
Nouvelle-Aquitaine	438	7.3	7,759	10,481	36,427	105,960	21.3	9.9	132.8	175.3
Occitania	532	9.0	11,943	14,398	58,753	96,270	20.3	15.0	210.3	244.8
Pays de la Loire	275	7.3	7,069	8,327	32,034	78,461	22.1	10.6	193.1	220.3
Provence-Alpes-Côte d'Azur	501	9.9	6,265	9,663	25,186	67,925	24.9	14.2	126.3	191.4
All regions	6,064	9.1	121,299	137,683	624,330	992,441	19.4	13.9	184.7	205.6

Table 23 - Detail of inclusions by region.

Table 23 shows, for the 12 regions in mainland France (the data for the other regions being unusable given their very low numbers of inclusions), the number of inclusions for all pathologies combined and inclusions in studies on cancer, the share of inclusions in studies on cancer in relation to the total, and the number of inclusions in studies on cancer per 100,000 inhabitants. For all regions combined, there is a notable increase in the number of inclusions between the 2 periods, between 2010 and 2014 and between 2015 and 2019. On the other hand, the share of inclusions in studies on cancer has fallen, from 19.4% over the first period to 13.9% over the second.

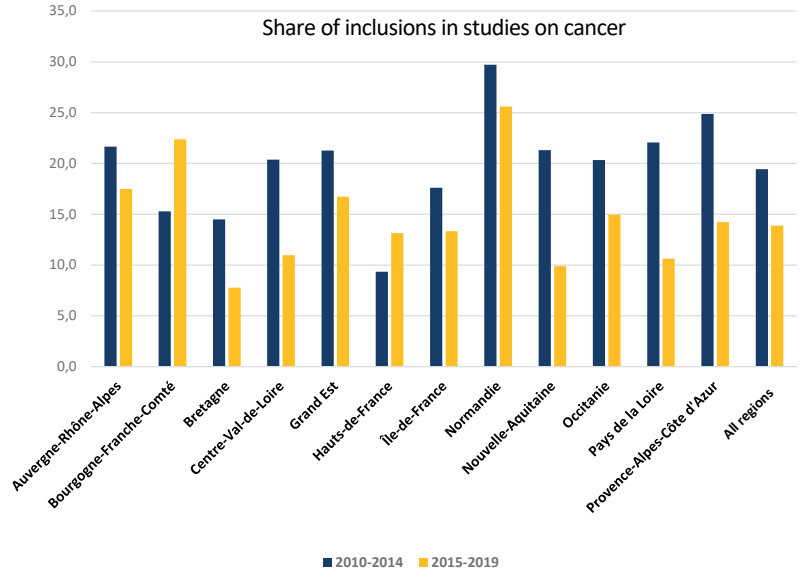


Figure 38 - Share of inclusions in studies on cancer, by region.

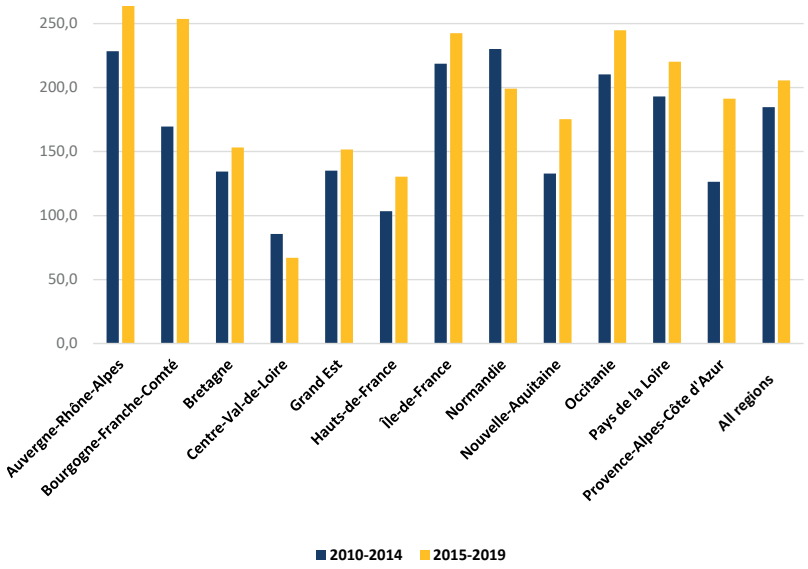


Figure 39 - Number of inclusions in studies on cancer / 100,000 inhabitants, by region.

Figure 38 & Figure 39 show the evolution of the 2 indicators presented above by region.

There is a great diversity in the ratio of inclusions in studies on cancer: from 9.3% to 29.7% between 2010 and 2014 and from 7.8% to 25.8% between 2015 and 2019. Overall, there is a visible decrease across all regions, except Bourgogne-Franche-Comté and Hauts-de-France.

The number of inclusions in studies on cancer per 100,000 inhabitants increased between the 2 periods, from 185 to 205, which is normal as the total number of inclusions in studies on cancer also increased between the 2 periods. This increase is present in almost all regions, but with variations that are more or less significant.
Such disparities give way to a number of questions. Among the possible causes:

- Access to care, in particular care in CHU or CLCC, which represent 83% of inclusions;
- The existence of a territorial network (EMRC [Mobile Clinical Research Teams], healthcare or research networks), which allows for easier access to clinical trials;
- The prevalence of cancer, which is presumably not the same across all regions.

IV Analysis of scientific publications

Scientific publications were analyzed using the Web of Science Core Collection database [6] and the InCites platform [7], 2 products marketed by the company Clarivate Analytics. The Web of Science is a multidisciplinary database that lists all production, across all categories, including non-medical fields. It also allows for keyword searches and thus makes it possible to constitute corpora of publications (by cancer site, for example). These corpora can then be analyzed with a bibliometric tool, such as the InCites platform.

The InCites platform is a tool that provides data aggregated by country, by institution, or by thematic field. It also makes it possible to work with numerous bibliometric indicators, that are either quantitative (number of publications, for example) or qualitative (Category Normalized Citation Index, for example) in nature. The indicators used in the rest of this report are detailed in the appendix under "Methodology". All Web of Science data since 1980 are available on InCites.

Each article is published in a journal. Clarivate Analytics groups journals according to 2 main classifications:

The ESI (Essential Science Indicators) classification [8], which includes 22 fields;

- The Web of Science Categories classification [9], which includes 254 fields. These fields can be re-aggregated to form a new classification. For example, the OECD classification (Frascati), which includes 6 major fields [10].
- The list of Web of Sciences Categories as well as the OECD correspondence are available on the Clarivate Analytics website.

The "Medical & Health Sciences" field, which measures production in biomedical research, groups together 59 WoS Categories and represents, in France and worldwide, around 25% of all global scientific production [Table 24]. By adding a few more fundamental categories, such as genetics, biochemistry, or biology (classified under Natural Sciences), the share of research in biology/healthcare reaches almost 30%.

Categories	2010-2014		2015-2019	
	Nb. of publ.	Share	Nb. of publ.	Share
Natural Sciences	3,654,890	36.1	4,510,395	35.2
Engineering & Technology	1,833,402	18.1	2,599,578	20.3
Medical & Health Sciences	2,621,958	25.9	3,225,139	25.2
Agricultural Sciences	384,067	3.8	464,865	3.6
Social Sciences	1,146,991	11.3	1,439,316	11.2
Humanities	485,776	4.8	574,772	4.5

Table 24 - Share of medical research worldwide.

A

General data on French scientific production

Historically, France has always been a major contributor to research on a global scale. Table 25 shows the evolution of French and global scientific production, all categories combined. There has been a spectacular increase over the last 40 years, with global production almost multiplied by 5. France, despite having multiplied its production by almost 4, moved down from 5th to 7th place worldwide. From 1980 to 1984, France co-authored 5.5% of articles, compared with 4.3% from 2015 to 2019.

These indicators are volume indicators only, and do not measure the impact of these publications. The impact of a publication is often measured by the number of times it has been cited. As the number of citations strongly depends on the age of the article and its field, we prefer to use the Category Normalized Citation Index. Among the most common are the CNCI (Category Normalized Citation Impact), the Top 1%, or the Top 10% (see "Methodology"). Table 24 shows that the Category Normalized Citation Impact of French publications has continuously increased over the 8 periods in question.

For more information:
Cancer Sheet
Testicular

	All categories combined							
	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019
Worldwide (Nb. of publ.)	2,222,267	2,568,191	2,936,424	3,658,016	4,166,861	5,916,486	8,105,405	10,293,182
France (Nb. of publ.)	**121,609**	**142,581**	**172,598**	**232,413**	**255,303**	**317,177**	**389,333**	**444,389**
Share France/Worldwide	5.5	5.6	5.9	6.4	6.1	5.4	4.8	4.3
Rank (worldwide)	5	5	5	5	5	6	6	7
Category Normalized Citation Index	0.79	0.85	0.94	1.02	1.05	1.12	1.20	1.24

Table 25 - Evolution of French scientific production over the last 40 years, all categories combined.

The decrease in France's share is largely linked to the exponential increase in scientific production in certain countries: China, of course, but also India, Australia, Brazil, and South Korea. To a lesser extent, there are also significant increases for Turkey and Iran. In Europe specifically, Italy and Spain also show significant increases.

Table 26 provides the same data, but restricted to the "Medical & Health Sciences" field. France's share fell from 6.2% to 4%, i.e., a drop of 2.2%, greater than the decrease for all categories combined. France also moved from 4th to 9th place worldwide. On the other hand, there is a stronger increase in the Category Normalized Citation Index.

	Medical & Health Sciences							
	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019
Worldwide (Nb. of publ.)	732,686	874,711	983,106	1,227,810	1,373,455	1,869,032	2,599,250	3,207,766
France (Nb. of publ.)	**45,146**	**51,096**	**57,451**	**73,437**	**76,470**	**91,248**	**112,052**	**128,944**
Share France/Worldwide	6.2	5.8	5.8	6.0	5.6	4.9	4.3	4.0
Rank (worldwide)	4	5	5	5	5	7	8	9
Category Normalized Citation Index	0.54	0.66	0.79	0.92	1.00	1.18	1.41	1.70

Table 26 - Evolution of French scientific production over the last 40 years, focusing on medical research.

This same analysis can be applied to the "Oncology" category, which brings together all journals specializing in oncology. However, this analysis does not take into account cancer-related articles published in journals not specializing in cancer. **Table 27** shows that France's share, which was 4.2 over the first period, increased through to 2000 before gradually decreasing to reach 4.6% over the last period. France remained in 6th place worldwide for a long time, and has since been in 7th place for the last 10 years. The Category Normalized Citation Index also continuously increased to reach 2.44 from 2015 to 2019. This means that publications co-signed by French authors from 2015 to 2019 have an average number of citations equal to 2.5 times the global average.

	Oncology							
	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019
Worldwide (Nb. of publ.)	37,001	47,992	61,665	83,649	98,185	135,358	200,806	283,658
France (Nb. of publ.)	**1,555**	**2,455**	**3,965**	**5,438**	**5,919**	**7,811**	**10,596**	**13,179**
Share France/Worldwide	4.2	5.1	6.4	6.5	6.0	5.8	5.3	4.6
Rank (worldwide)	5	6	6	6	6	6	7	7
Category Normalized Citation Index	0.86	0.98	1.03	1.07	1.17	1.35	1.69	2.44

Table 27 - Evolution of French scientific production in oncology journals over the last 40 years.

Scientific production in oncology journals has vastly changed over the last 40 years, as shown in **Table 28**, which provides the contribution (number of publications) of the various countries over the 8 periods analyzed.

	Number of publications - Oncology							
Country	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019
0: Worldwide	37,001	47,992	61,665	83,649	98,185	135,358	200,806	283,658
United States	17,775	20,732	24,973	32,248	39,114	53,941	71,277	86,740
China	101	251	381	688	1,464	6,012	29,595	81,128
Japan	3,362	4,380	6,935	10,640	12,300	12,877	15,969	20,014
Germany	2,074	2,997	3,995	6,907	8,659	11,552	14,399	17,743
Italy	1,545	2,912	4,683	6,809	7,778	9,817	12,569	16,775
United Kingdom	2,937	4,105	5,774	7,388	8,169	10,640	13,354	16,106
France	1,555	2,455	3,965	5,438	5,919	7,811	10,596	13,179
Canada	1,158	1,710	2,474	3,296	4,013	6,496	9,696	12,119
South Korea	8	37	84	518	1,478	3,857	7,622	10,997
Netherlands	728	1,512	2,324	3,424	3,910	5,332	6,947	8,866
Australia	519	736	1,025	1,573	2,128	3,554	6,209	8,571
Spain	134	286	771	1,570	2,098	3,695	5,727	8,040
India	253	394	578	757	769	1,697	4,545	7,165
Taiwan	28	86	284	785	1,311	2,126	3,709	5,539
Switzerland	458	602	1,135	1,479	1,832	2,678	3,765	5,220
Sweden	910	1,353	1,855	2,522	2,780	3,451	4,314	5,135
Belgium	407	680	846	1,350	1,667	2,342	3,252	4,428
Turkey	12	31	122	411	1,058	2,185	3,675	3,762
Poland	179	206	277	534	880	2,018	2,621	3,690
Denmark	379	627	844	984	999	1,639	2,573	3,685

Table 28 - Evolution of scientific production in oncology journals over the last 40 years: 20 main countries.

Figure 40 shows the predominance of the United States throughout the period analyzed, where production intensified from 2000-2004 onward. In China, production soared as of 2005-2009. Over the last period (2015-2019), its production was almost equal to that of the United States. This exponential evolution is not, however, specific to cancer research, as China's production is similar across many disciplinary fields.

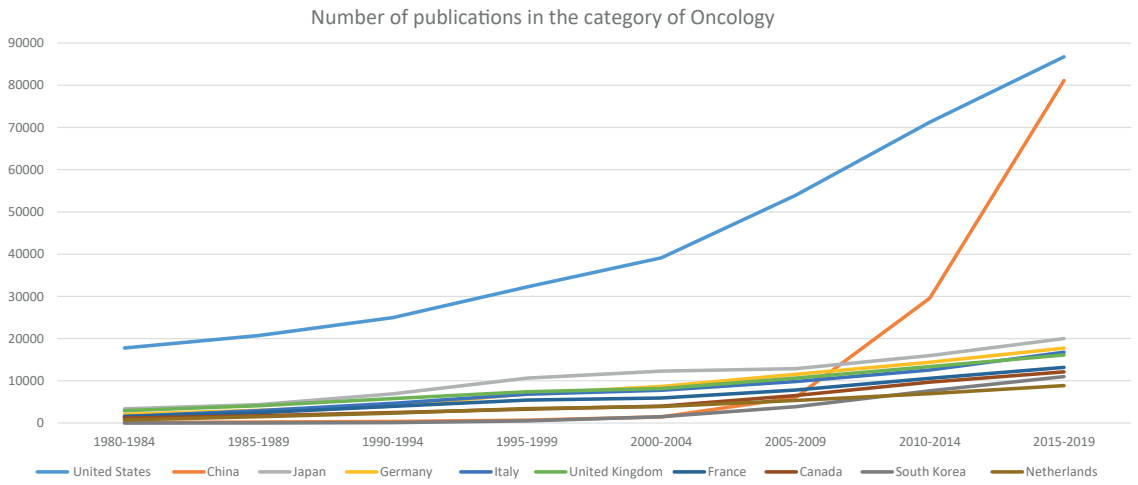


Figure 40 - Evolution of scientific production in oncology journals over the last 40 years: 10 main countries.

If we remove these 2 countries and examine the next 10 countries [**Figure 41**], Japan comes in 3rd place, followed by Germany, Italy, and the United Kingdom. There have been decidedly broad variations over the past 40 years.

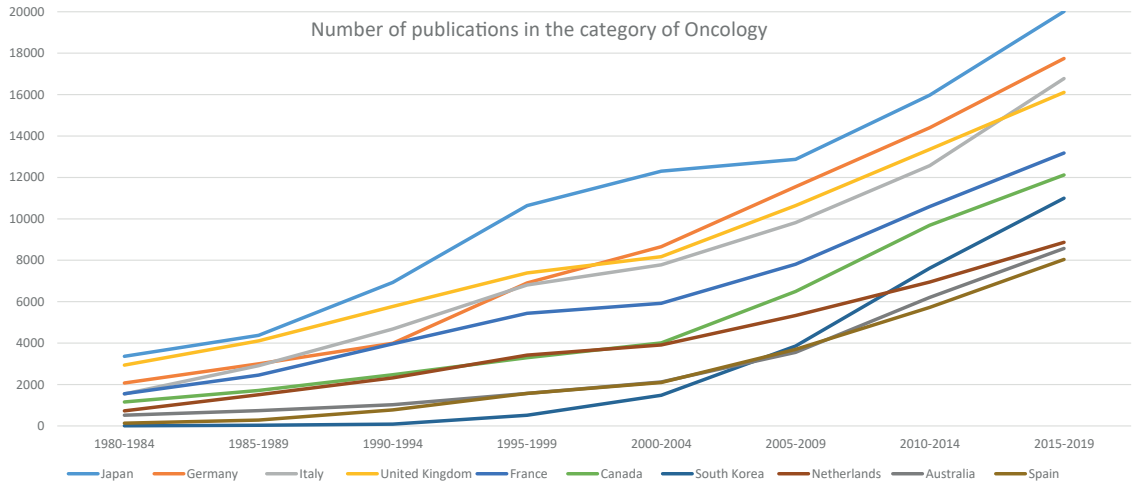


Figure 41 - Evolution of scientific production in oncology journals over the last 40 years: 10 main countries.

The evolution of several countries is of note:

- Japan, which had long been in second place worldwide, now ranks third behind the United States and China. Over the last period, Japan was in 6th position with regard to medical research, but in 3rd place for oncology: possible causes include the esophageal cancer screening policy initiated many years ago and the fallout from Hiroshima and Nagasaki.
- The positioning of the United Kingdom, generally in second place worldwide in many areas. In oncology, it long held third place worldwide, but gradually dropped to 6th place over the last period in question.
- South Korea, which moved from 43rd place worldwide to 9th. South Korea has been in the top 10 countries over the last 3 periods.
- Spain, which has moved from 22nd place worldwide to 12th in the space of 20 years.
- And finally, Sweden, which has moved from 8th place worldwide to 16th over the last 20 years.

France ranks 7th worldwide, closely followed by Canada and South Korea; the latter having increased its production significantly since the 2000s.

For more information:
Cancer Sheet
Ovarian

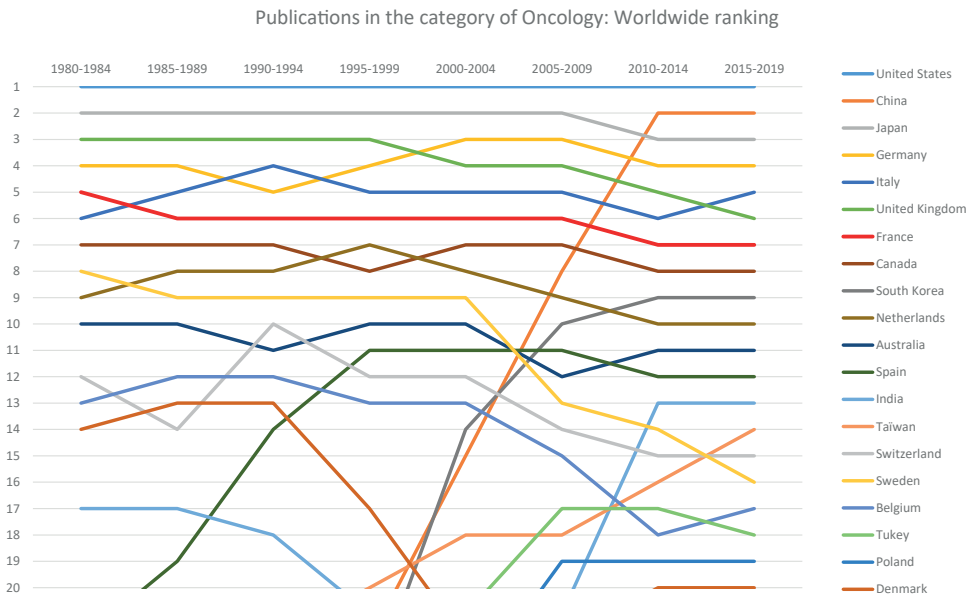


Figure 42 - Evolution of worldwide rankings in oncology journals over the last 40 years: 20 main countries.

Figure 42 shows the evolution of world rankings for the top 20 countries from 2015 to 2019. It confirms the strong evolutions observed in the previous charts. However, there is a certain stability between the last 2 periods (2010 to 2004 and 2015 to 2019).

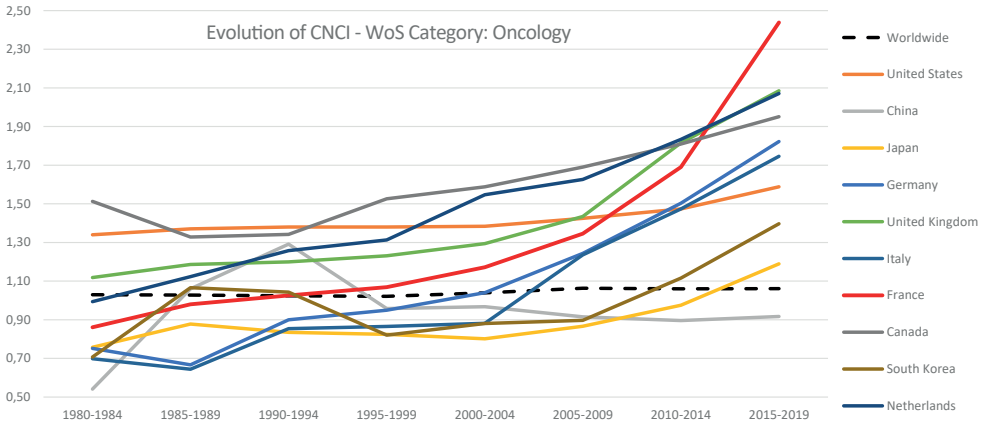


Figure 43 - Evolution of the CNCI for the 10 main countries publishing in oncology journals, from 2010 to 2019.

Figure 43 shows the evolution of production impact in terms of citations, measured by the CNCI. France, in addition to maintaining 7th place in terms of volume, has seen its CNCI increase considerably since the 2000s, jumping from a CNCI of 1.17 from 2000 to 2004 to a CNCI of 1.69 from 2010 to 2014 and finally 2.44 from 2015 to 2019. These figures confirm the excellence of French research on oncology.

Figure 44 shows the evolution, between 2010-2014 and 2015-2019, of 2 indicators:

- The Specialization Index, which is the ratio between the share of a category in a given country and the share of the same category worldwide. A specialization index greater than 1 shows an over-specialization, and an index lower than 1 a sub-specialization.
- The Category Normalized Citation Index (CNCI), which measures the impact in terms of citations, taking into account the year of publication and the category.

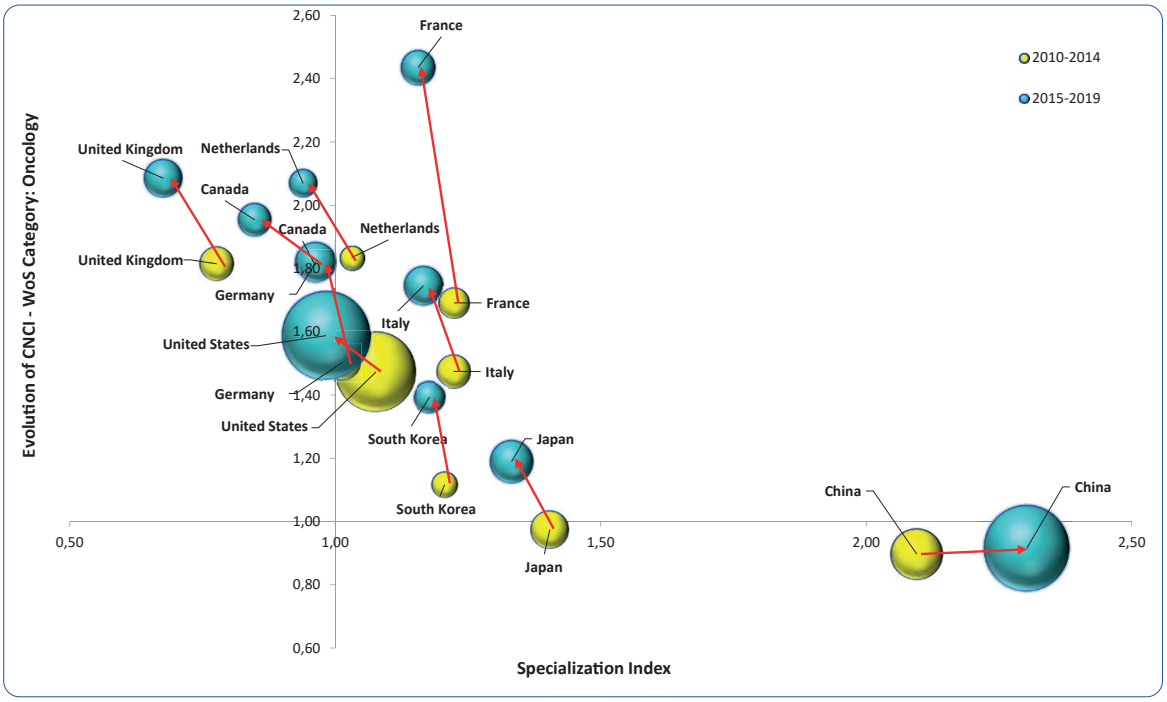


Figure 44 - Evolution of CNCI and SI in oncology, from 2010 to 2014 and from 2015 to 2019.

Among the 10 countries with the highest levels of scientific production in oncology over the past 10 years, France is the country whose CNCI has increased the most. China, which has demonstrated its significant over-specialization, has a CNCI of less than 1 that has not increased. Also noteworthy is the United Kingdom, which shows an equally significant increase in its CNCI, despite its sub-specialization in oncology.

For more information: Cancer Sheet **Thyroid**

For more information: Cancer Sheet **Pancreatic**

B

French scientific production in the field of oncology (2010-2019)

Having determined the position that French research holds on a global scale, we are now going to focus specifically on the period from 2010 to 2019 and on cancer research.

1. France's positioning in terms of cancer research

Oncology is a highly cross-cutting discipline. As such, only about a third of publications relating to cancer are actually published in oncology journals, with the remaining two thirds being published in specialized journals that focus on cell biology, surgery, imaging, hematology, neurology, or urology, for example. An assessment that covers cancer-related scientific production as a whole thus cannot limit itself to publications produced in oncology journals or to the WoS category of "Oncology".

In order to take all publications into account, we used a query in the Web of Science to identify all articles:

- Published in a journal specializing in cancer (under the WoS category of "Oncology");
- Containing key terms specific to cancer in the title or keywords, such as "cancer", "tumor", "neoplasms", etc.;
- Containing key terms specific to cancer sites in the title or keywords, such "glioma", "glioblastoma", "mesothelioma", etc.

These key terms were identified using those available in the MeSH thesaurus [11] or derived from a sample of articles published in oncology journals. The list of key terms was then validated by 2 oncology experts.

Table 29 provides the results of this query: worldwide, we identified 1,120,821 publications (Articles or Reviews) relating to cancer from 2010 to 2019, with 447,900 over the first period and 672,921 over the second (i.e., a 50% increase).

	2010-2019	2010-2014			2015-2019			Evolution
Countries/Regions	Nb. of publ.	Nb. of publ. 2010-2014	Rank	Share	Nb. of publ. 2015-2019	Rank	Share	
Worldwide	**1,120,821**	**447,900**			**672,921**			**50%**
United States	334,212	145,541	1	32.49	188,671	1	28.04	30%
China	233,415	66,373	2	14.82	167,042	2	24.82	152%
Japan	82,898	36,144	3	8.07	46,754	3	6.95	29%
Germany	75,024	33,595	4	7.50	41,429	4	6.16	23%
Italy	68,160	28,583	6	6.38	39,577	5	5.88	38%
United Kingdom	67,289	29,073	5	6.49	38,216	6	5.68	31%
France	**51,652**	**22,905**	**7**	**5.11**	**28,747**	**7**	**4.27**	**26%**
South Korea	48,028	19,717	8	4.40	28,311	8	4.21	44%
Canada	44,954	19,061	9	4.26	25,893	9	3.85	36%
India	34,402	10,442	13	2.33	23,960	10	3.56	129%

Table 29 - Worldwide ranking for the number of publications on oncology, all cancer sites combined (solid and liquid tumors) from 2010 to 2019.

While France moved from 8th to 9th place worldwide in terms of medical research, it retained 7th place for oncology, all cancer sites combined (solid and liquid tumors); though South Korea is not far behind. However, its share in global production dropped from 5.11% to 4.27%. This must be put into perspective with the boom in production in certain countries such as China or India, whose production over the last 5 years has increased very sharply (+152% for China, +129% for India).

For more information:
Cancer Sheet
Uterine

2. Publication categories

After identifying all the publications relating to cancer, we looked into the distribution of these publications in the various Web of Science Categories, by comparing this distribution on a global scale (1,120,821 publications) and for France (51,652 publications).

Table 30 shows, for each of the 2 periods, the distribution worldwide and the distribution in France. As expected, publications in oncology journals represent around 38% of publications worldwide, while France's rate is around 42%.

The distribution profile of French publications is not exactly identical to the worldwide distribution profile: France publishes more than the global average in journals on oncology, imaging, hematology, and immunology. It publishes less than the global average in journals on cell biology, biochemistry, pharmacology, and experimental medicine. The "Medicine, General & Internal" and "Multidisciplinary Sciences" categories include generalist journals, and particularly major medical or scientific journals.

	Monde	France	Monde		France		Différence	
WoS Category	2010-2019		2010-2014	2015-2019	2010-2014	2015-2019	2010-2014	2015-2019
Oncology	425 926	21850	37,8	38,2	41,8	42,7	4,0	4,6
Cell Biology	80 100	3201	5,9	8,0	5,8	6,5	-0,1	1,5
Surgery	76 285	2995	7,7	6,2	5,7	5,8	-2,0	0,4
Medicine Research Experimental	67 585	1676	4,7	6,9	3,1	3,3	-1,6	3,6
Biochemistry Molecular Biology	67 146	2252	6,4	5,7	5,0	3,9	-1,4	1,9
Radiology Nuclear Medicine Medical Imaging	61 237	3728	5,9	5,2	7,1	7,3	1,2	2,2
Pharmacology Pharmacy	57 152	1892	5,0	5,1	3,8	3,5	-1,2	1,6
Hematology	51 872	4062	5,4	4,1	8,0	7,8	2,5	3,7
Pathology	47 811	1767	4,7	4,0	3,7	3,2	-1,0	0,8
Medicine General Internal	43 815	1358	3,0	4,5	2,1	3,1	-0,9	1,5
Gastroenterology Hepatology	39 489	1533	3,9	3,2	3,0	2,9	-0,9	0,3
Multidisciplinary Sciences	38 782	1685	3,5	3,4	3,0	3,5	-0,5	0,0
Immunology	36 822	2415	3,6	3,1	4,4	4,9	0,8	1,8
Genetics Heredity	27 840	1325	2,8	2,3	3,0	2,2	0,2	0,1
Clinical Neurology	27 310	1421	2,7	2,3	2,9	2,7	0,2	0,4
Urology Nephrology	27 258	2081	2,6	2,3	4,5	3,7	1,9	1,4
Obstetrics Gynecology	25 017	1109	2,5	2,1	2,4	2,0	-0,1	0,1
Biotechnology Applied Microbiology	23 214	634	2,0	2,1	1,4	1,1	-0,7	1,0
Public Environmental Occupational Health	22 711	1352	2,3	1,9	2,8	2,5	0,5	0,6
Chemistry Multidisciplinary	21 080	542	1,4	2,2	0,7	1,3	-0,7	0,9

Table 30 - Distribution across the 20 main Web of Science Categories.

Position of major generalist journals

We sought to establish the respective positions of the same countries for the 6 major international generalist journals (top 6): Journal of the American Medical Association (JAMA), New England Journal of Medicine (NEJM), The Lancet, The British Journal of Medicine (BMJ), Nature, and Science. On a global scale, among the 1,120,821 cancer publications we identified, we isolated 2,121 publications produced in these 6 major generalist journals over 10 years, i.e., 0.19% of the publications.

Table 31 provides, for the top 25 countries in terms of volume over the 10 years, and by period, the publication rates in these 6 journals as well as the associated world rankings. Unsurprisingly, the United States is associated with over 70% of these publications, and the United Kingdom with around 30%. Germany moved from a rate of 15.75% to a rate of 22%.

In France, the share of publications produced in these 6 journals is 0.69%; a share well above the global average. France co-authored 13.8% of these articles over the first period (143 publications) and 19.2% over the second (211), i.e., a 48% increase. In this niche, France has thus moved up from 5th to 4th place worldwide, while it ranks 7th worldwide for all cancer publications combined. Once again, this demonstrates the excellence of French research.

Conversely, China, which ranks second in terms of the volume of publications, only ranks 13th across the 6 major generalist journals. This is perfectly consistent with Figure 44, which shows that China has a low citation impact.

Country	2010-2019			2010-2014			2015-2019			Evolution
	Nb. of publ. (all journals combined)	Nb. of publ. (Top 6 A+ journals)	Share (%)	Nb. of publ. (Top 6 A+ journals)	Rank	Share (%)	Nb. of publ. (Top 6 A+ journals)	Rank	Share (%)	
Worldwide	**1,120,821**	**2,131**	**0.19**	**1,035**			**1,096**			**6%**
United States	334,212	1,571	0.47	731	1	70.63	840	1	76.64	15%
China	233,415	127	0.05	39	14	3.77	88	13	8.03	126%
Japan	82,898	163	0.20	50	13	4.83	113	11	10.31	126%
Germany	75,024	404	0.54	163	4	15.75	241	3	21.99	48%
Italy	68,160	300	0.44	129	6	12.46	171	6	15.60	33%
United Kingdom	67,289	637	0.95	313	2	30.24	324	2	29.56	4%
France	**51,652**	**354**	**0.69**	**143**	**5**	**13.82**	**211**	**4**	**19.25**	**48%**
South Korea	48,028	119	0.25	31	20	3.00	88	13	8.03	184%
Canada	44,954	367	0.82	168	3	16.23	199	5	18.16	18%
India	34,402	18	0.05	7	31	0.68	11	34	1.00	57%
Spain	33,567	242	0.72	86	9	8.31	156	7	14.23	81%
Australia	32,910	272	0.83	116	7	11.21	156	7	14.23	34%
Netherlands	32,365	227	0.70	99	8	9.57	128	9	11.68	29%
Taiwan	22,711	47	0.21	13	26	1.26	34	24	3.10	162%
Turkey	21,278	29	0.14	6	33	0.58	23	28	2.10	283%
Brazil	20,096	63	0.31	19	23	1.84	44	21	4.01	132%
Sweden	19,493	139	0.71	71	11	6.86	68	16	6.20	-4%
Switzerland	19,179	180	0.94	64	12	6.18	116	10	10.58	81%
Poland	16,582	88	0.53	36	16	3.48	52	17	4.74	44%
Belgium	15,229	168	1.10	76	10	7.34	92	12	8.39	21%

Table 31 - Worldwide ranking for the number of cancer publications in the 6 major generalist journals.

3. Respective contributions of the various players

Based on France's positioning with respect to the world in terms of oncology, we sought to measure the respective contributions of the various players in healthcare research: CHU, CH, and CLCC, but also Universities, INSERM, and CNRS (French National Center for Scientific Research): all trusted partners in biomedical research.

These analyses are based on the Unified (Organization-Enhanced) Institutions of the Web of Science, grouping together all CHU/CH, all CLCC, and all Universities. The list of institutions is available in the appendix to the report.

Table 32 and **Figure 45** show the various players' participation in scientific production in the field of oncology: around 69% of the articles are co-authored by a University, 56% by CHU or CH, 39% by INSERM, 34% by CLCC, and 20% by the CNRS. Public establishments hold a leadership position in cancer research. Numerous researchers working in Healthcare Establishments are also affiliated with a university. This is also the case for EPST researchers who are jointly supervised by their affiliated university. It is therefore quite normal to see a very large share of publications co-authored by a University. If the signature charts were respected, this number would be even higher.

For more information:
Cancer Sheet
Bone

Year	Number of documents								Percentage compared to France				
	France			CHU/CH	CLCC	Universities	INSERM	CNRS	CHU/CH	CLCC	Universities	INSERM	CNRS
	TOTAL Publications	In Top 10%	In Top 20%										
2010	4,189	693	1,184	2,397	1,275	2,735	1,462	716	57.2	30.4	65.3	34.9	17.1
2011	4,319	731	1,250	2,454	1,377	2,848	1,564	735	56.8	31.9	65.9	36.2	17.0
2012	4,666	822	1,444	2,646	1,542	3,107	1,680	794	56.7	33.0	66.6	36.0	17.0
2013	4,820	899	1,497	2,727	1,568	3,317	1,758	848	56.6	32.5	68.8	36.5	17.6
2014	4,911	921	1,523	2,822	1,649	3,427	1,815	894	57.5	33.6	69.8	37.0	18.2
2015	5,412	1,026	1,650	3,001	1,861	3,755	2,105	1,070	55.5	34.4	69.4	38.9	19.8
2016	5,656	1,084	1,738	3,105	1,892	3,980	2,277	1,142	54.9	33.5	70.4	40.3	20.2
2017	5,805	1,137	1,773	3,261	2,016	4,126	2,444	1,239	56.2	34.7	71.1	42.1	21.3
2018	5,670	1,111	1,778	3,162	1,953	4,004	2,320	1,199	55.8	34.4	70.6	40.9	21.1
2019	6,204	1,194	1,910	3,442	2,230	4,486	2,629	1,434	55.5	35.9	72.3	42.4	23.1
TOTAL	51,652	9,618	15,747	29,017	17,363	35,785	20,054	10,071	56.2	33.6	69.3	38.8	19.5

Table 32 - Evolution of the number of publications on oncology, all cancer sites combined (solid and liquid tumors), for CHU/CH, CLCC, Universities, INSERM, and CNRS, from 2010 to 2019.

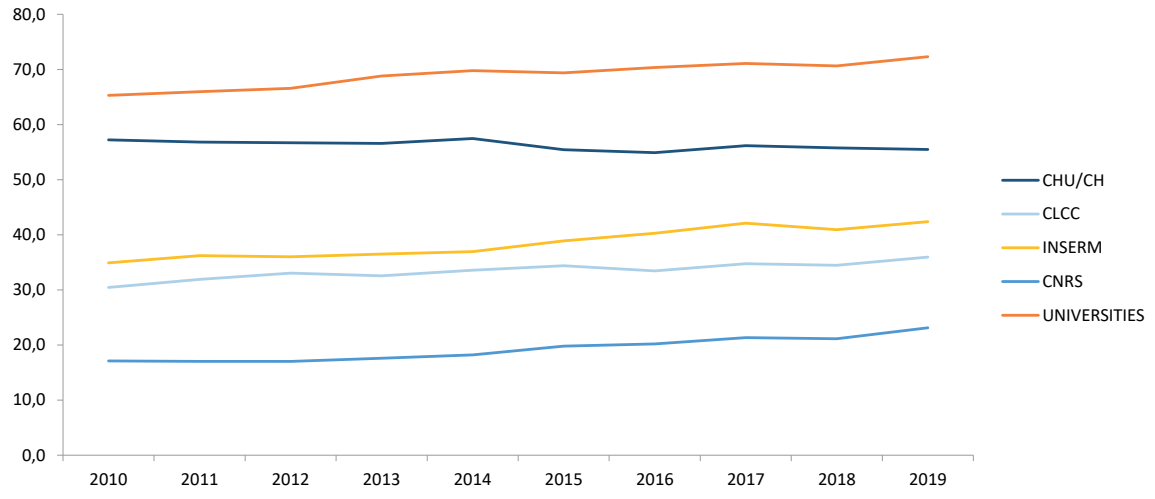


Figure 45 - Evolution of the number of publications on oncology, all cancer sites combined (solid and liquid tumors), for CHU/CH, CLCC, Universities, INSERM, and CNRS, from 2010 to 2019.

Figure 45 shows a certain level of stability over time.

For more information:
Cancer Sheet
Kidney

Table 33 & Table 34 provide several indicators for each period and each player:

- The Category Normalized Citation Impact;
- The percentage of articles in the Top 1%;
- The percentage of articles in the Top 10%.

These 3 indicators measure the scientific excellence of said research. We also measured:

- The percentage of articles benefitting from international collaboration, which measures openness to foreign countries;
- The percentage of Open Access articles, which measures compliance with Plan S (Open-Access Science);
- The percentage of articles with a Corresponding Author, which indicates that the work is the result of coordinated efforts.

2010-2014								
Institutions	Nb. of documents	Nb. of citations	CNCI	% Documents in Top 1%	% Documents in Top 10%	% International Collaboration	% Open Access	% Corresponding Author
France	**22,905**	**1,049,879**	**1.58**	**3.02**	**17.75**	**44.86**	**38.40**	**70.93**
CHU/CH	13,046	575,537	1.55	3.20	17.35	34.64	33.80	52.57
CLCC	7,411	409,392	1.83	3.81	19.42	40.45	38.69	45.90
Universities	15,434	708,912	1.59	3.02	18.28	40.72	40.04	45.77
INSERM	8,279	396,789	1.58	2.71	19.59	42.75	50.24	36.94
CNRS	3,987	159,140	1.35	1.86	17.11	43.74	49.26	34.39

Table 33 - Bibliometric indicators for CHU/CH, CLCC, Universities, INSERM, and CNRS in France, from 2010 to 2014.

Between the 2 periods analyzed, there is an increase in the CNCI (Category Normalized Citation Impact) from 1.58 to 2.05. There is also a sharp increase in the number of Open Access articles and the number of articles that benefitted from international collaboration. There is a slight decrease in the percentage of articles with a Corresponding Author, which is consistent with the increased percentage of articles benefitting from international collaboration.

2010-2014								
Institutions	Nb. of documents	Nb. of citations	CNCI	% Documents in Top 1%	% Documents in Top 10%	% International Collaboration	% Open Access	% Corresponding Author
France	**28,747**	**729,575**	**2.05**	**4.06**	**19.32**	**53.03**	**50.58**	**66.39**
CHU/CH	15,971	364,080	1.90	4.08	19.14	43.03	47.20	49.77
CLCC	9,952	281,364	2.26	5.41	22.27	49.39	51.18	40.22
Universities	20,351	473,862	1.90	3.85	19.57	50.16	51.63	46.26
INSERM	11,775	249,846	1.74	3.53	20.13	47.55	57.85	37.63
CNRS	6,084	103,334	1.42	2.17	17.15	50.40	58.82	38.66

Table 34 - Bibliometric indicators for CHU/CH, CLCC, Universities, INSERM, and CNRS in France, from 2015 to 2019.

4. Analysis by cancer site

The second stage of the study consisted in carrying out the same analyses for each type of cancer site. We there used a specific query and produced the same tables for each cancer site. The results of these analyses are presented in the form of fact sheets, with one sheet per site.

Table 35 provides, for each period and each organ, a summary comprising several indicators:

- For publications: the number of publications, the global market share (in %), the worldwide ranking (W rank), the European ranking (E rank), and the CNCI (impact indicator);
- For clinical studies: the number of open studies in France, the market share (in %), and the worldwide ranking.

The rankings of the different countries, the contributions of the various players, and the teams with a high level of international visibility are available in the fact sheets.

Sheet	Organ	Scientific publications										Clinical studies					
		2010-2014					2015-2019					2010-2014			2015-2019		
		Nb.	Share	W rank	E rank	CNCI	Nb.	Share	W rank	E rank	CNCI	Nb.	Share	Rank	Nb.	Share	Rank
All cancers combined		22,905	5.11	7	4	1.58	28,747	4.27	7	4	2.05	1,688	10.93	2	2,042	9.53	3
S00	Solid tumors	17,639	4.88	7	4	1.61	22,273	4.03	8	4	2.14	1,142	10.23	2	1,435	9.13	3
S01	Breast	2,360	5.39	7	4	1.49	2,641	4.12	10	4	1.73	215	11.89	2	250	9.63	3
S02	Lung	1,414	4.81	8	4	1.54	2,026	4.01	8	4	2.53	149	11.16	3	235	10.55	3
S03	Brain	1,387	5.67	6	3	1.36	1,843	4.90	6	3	1.58	73	9.96	2	77	7.63	3
S04	Skin	1,134	4.68	8	4	2.14	1,676	4.42	8	4	2.67	102	10.63	2	120	10.75	2
S05	Colorectal	1,128	4.59	8	4	1.96	1,376	3.60	10	6	1.82	115	9.79	3	136	9.01	3
S06	Prostate	1,105	5.45	8	4	2.08	1,297	4.65	9	4	2.14	94	9.95	3	90	7.44	3
S07	Liver	726	4.20	8	3	1.83	974	3.41	8	3	2.29	56	9.81	4	62	8.07	3
S08	Head and Neck	621	3.71	9	4	1.22	872	3.17	12	4	1.51	63	10.14	3	87	9.19	3
S09	Ovarian	463	4.50	10	4	1.31	596	3.78	10	4	1.87	46	8.61	3	50	7.36	4
S10	Pancreatic	396	4.24	7	4	2.17	590	3.76	8	4	2.03	33	5.96	4	51	6.61	3
S11	Bone	496	4.93	7	4	1.06	570	3.59	8	4	1.09	19	9.00	3	26	9.77	2
S12	Kidney	584	7.89	6	3	1.48	569	5.11	7	4	3.27	37	10.91	2	59	14.64	2
S13	Bladder	386	6.16	7	4	1.75	455	4.58	8	4	2.89	15	8.24	2	45	10.74	3
S14	Stomach and Esophageal	301	1.82	11	5	1.59	365	1.34	13	5	2.12	34	5.38	6	55	5.64	4
S15	Uterine	254	4.33	9	4	0.92	305	3.52	11	4	1.60	22	5.00	7	43	6.96	3
S16	Thyroid	304	4.78	7	3	1.16	289	2.74	11	4	2.48	28	15.30	2	26	12.50	3
S17	Testicular	79	4.63	7	4	-	103	4.80	7	4	-	-	-	-	-	-	-
H00	Hematology	4,974	6.31	7	4	1.53	6,210	5.98	7	4	1.76	388	13.96	2	384	11.00	3
H01	Multiple Myeloma of the Bones	472	6.55	7	4	1.78	773	7.27	5	3	2.62	55	9.42	2	74	11.64	2
H02	Chronic Lymphoid Leukemia	489	6.16	6	4	1.79	699	6.47	6	4	1.86	45	13.35	2	26	7.39	6
H03	Acute Myeloid Leukemia	548	7.40	5	3	1.86	681	6.25	5	3	2.03	51	9.12	4	79	10.52	3
H04	Myelodysplastic Syndrome	186	7.70	6	3	1.98	233	7.14	6	3	1.58	33	9.30	2	46	12.20	2
H05	Diffuse Large B-Cell Lymphoma	117	6.83	7	3	-	161	5.60	7	3	-	28	14.43	2	31	10.10	3
H06	Follicular Lymphoma	105	13.32	2	1	-	105	11.06	5	3	-	23	12.92	2	20	9.52	3

Table 35 - Scientific production by organ and by period, in France and worldwide.

France's global share in terms of scientific publications dropped by almost 1 point (-0.84%) between the 2 periods. This is explained, as seen previously, by a highly significant increase on the global scale (+50% between the 2 periods). This decrease is less significant for hematology as a whole, with a more significant decrease for follicular lymphoma (small numbers). As for solid tumors, the decrease is more or less the same for all cancer sites except the kidney and the thyroid, which each decreased by more than 2 points.

France's global positioning is quite variable depending on the cancer site, though it often remains between 8th and 10th place worldwide. At the European level, France is generally positioned in 4th place behind Germany, Italy, and the United Kingdom.

With regard to open interventional clinical studies on cancer around the world, France dropped from second to third place worldwide behind the United States and China; the latter holding second place worldwide from 2015 to 2019. At the European level, France is almost always at the forefront of the rankings.

Sheet	Organ	Scientific publications - 2010-2019						
		Number of publications France	Share of publications - France					
			CHU/CH	CLCC	Universities	INSERM	CNRS	CHU/CH & CLCC joint publication
All cancers combined		51,652	56.2	33.6	69.3	38.8	19.5	15.4
S00	Solid tumors	39,912	53.6	36.2	68.0	37.0	18.9	15.8
S01	Breast	5,001	33.1	57.5	62.7	38.3	17.8	16.8
S02	Lung	3,440	63.4	32.9	66.0	33.2	11.4	17.1
S03	Brain	3,230	66.9	28.3	77.7	46.9	30.5	18.9
S04	Skin	2,810	58.4	37.8	65.3	35.7	17.5	16.5
S05	Colorectal	2,504	62.0	33.5	73.3	40.1	13.7	17.5
S06	Prostate	2,402	61.3	32.6	69.9	26.9	11.5	15.0
S07	Liver	1,700	70.9	21.9	73.1	48.6	11.2	11.2
S08	Head and Neck	1,493	51.0	51.6	56.4	24.4	11.9	22.5
S09	Ovarian	1,059	55.6	55.4	64.8	34.7	12.3	25.6
S10	Pancreatic	986	62.4	35.3	72.2	41.0	17.6	18.5
S11	Bone	1,066	64.7	38.0	65.3	32.0	11.9	18.8
S12	Kidney	1,153	67.4	40.4	61.0	22.4	10.0	21.4
S13	Bladder	841	71.8	24.4	77.1	18.5	7.8	13.0
S14	Stomach and Esophageal	666	59.3	29.9	57.7	28.1	5.9	18.0
S15	Uterine	559	57.6	47.0	54.7	26.3	4.8	21.3
S16	Thyroid	593	57.5	50.6	68.3	28.8	14.0	21.8
S17	Testicular	182	61.5	34.1	67.6	29.1	13.2	17.0
H00	Hematology	11,184	69.8	23.5	75.6	46.9	21.5	15.4
H01	Multiple Myeloma of the Bones	1,245	81.4	17.8	61.7	36.9	15.3	13.7
H02	Chronic Lymphoid Leukemia	1,188	70.4	19.1	76.0	50.2	27.9	12.5
H03	Acute Myeloid Leukemia	1,229	77.7	32.1	78.7	52.5	21.0	24.2
H04	Myelodysplastic Syndrome	419	83.1	26.3	80.7	38.9	19.8	22.9
H05	Diffuse Large B-Cell Lymphoma	278	78.1	42.4	76.3	44.2	20.9	32.0
H06	Follicular Lymphoma	210	82.9	40.0	74.8	50.0	21.9	31.0

Table 36 - Scientific production by organ and by period - Respective contributions.

Table 36 presents a summary of the 25 fact sheets in terms of contributions. For each cancer site, it provides the number of publications with at least one French author and the percentages of articles co-authored by CHU/CH, CLCC, Universities, INSERM, and the CNRS. We also have the percentage of articles co-authored by both a CHU/CH and a CLCC, which makes it possible to measure the level of cooperation between these 2 types of Healthcare Establishments. By more precisely examining the contributions of CHU/CH and those of CLCC, it is possible to observe:

- The strong predominance of CLCC with regard to breast cancer, with 60% of co-authored articles;
- The predominance of CHU/CH with regard to hematology (70% of articles), liver cancer (71%), brain and kidney cancers (67%), and many other solid tumors;
- Several cancer sites for which CHU/CH and CLCC have an equivalent level of contribution (head and neck, ovarian, thyroid, and uterine cancers).

These results can be seen very clearly in **Figure 46**, where the size of the bubbles corresponds to the number of scientific publications relating to the various cancer sites.

Aside from ovarian cancer (25% of articles co-authored by a CHU/CH and a CLCC), collaboration rates are noticeably low.

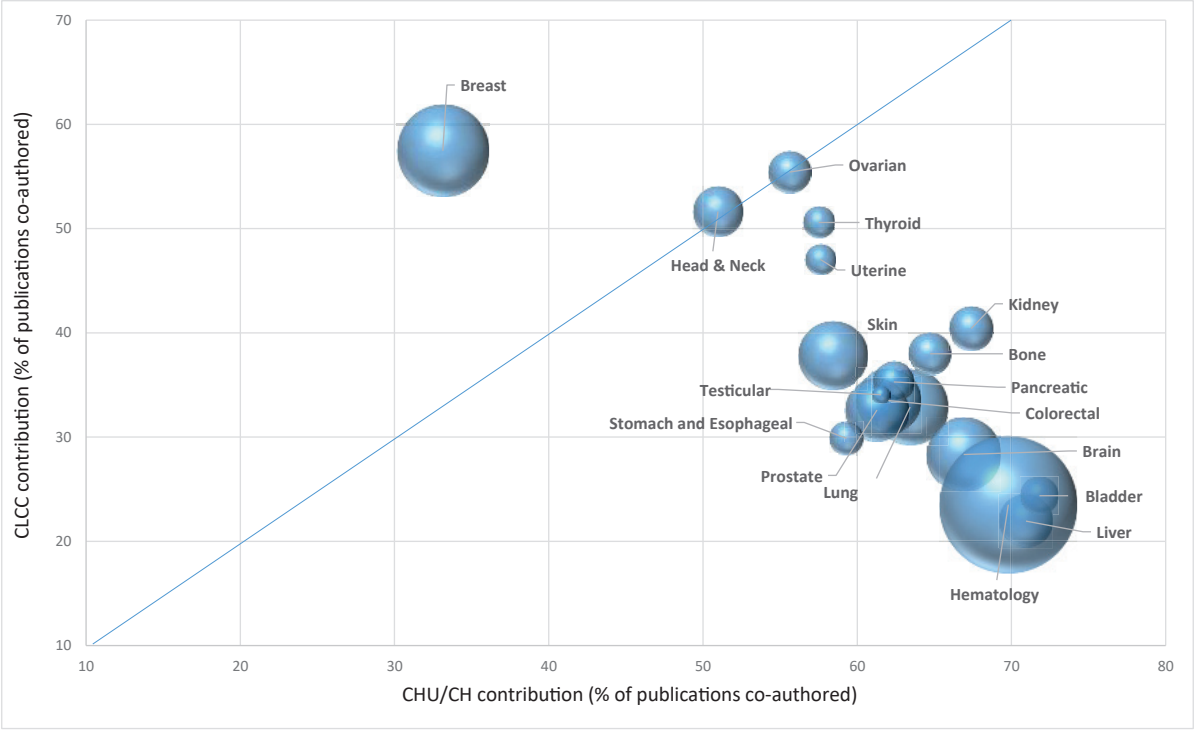


Figure 46 - Respective contributions by CHU/CH and CLCC according to the different cancer sites.

For more information:
Cancer Sheet
Bladder

V The link between cancer epidemiology and research

Finally, we investigated whether there was a link between the severity of the disease and the research effort observed. Having established the number of open clinical studies in France and the number of publications co-authored by a researcher in France by cancer site, we supplemented these data with data measuring severity: incidence and mortality.

The website of the International Agency for Research on Cancer, based in Lyon, France, provides indicators by organ and by country [12]. This offers estimated data with regard to prevalence, incidence, and mortality.

Table 37 provides, for France, the incidence and mortality rates of 17 cancer sites, as well as the number of publications and clinical trials. The associated rankings show that research efforts are not necessarily directly related to the severity of the disease. Lung cancer, the leading cancer in terms of mortality, only ranks in 3rd place in terms of publications and clinical trials. More glaringly, stomach and esophageal cancers sit in 7th place in terms of mortality, but come 14th in terms of scientific publications.

Organ	Incidence - 2020 (Nb. of people)		Mortality - 2020 (Nb. of people)		Nb. of publications (2015-2019)		Nb.of interv. CS (2015-2019)	
Lung	49,781	3	38,350	1	2,026	3	235	3
Colorectal	48,061	4	20,953	2	1,376	6	136	4
Hematology	35,177	5	16,743	3	6,210	1	384	1
Breast	58,083	2	14,183	4	2,641	2	250	2
Pancreatic	14,461	10	13,793	5	590	11	51	12
Liver	11,504	14	10,274	6	974	8	62	9
Stomach and Esophageal	12,450	13	9,287	7	365	14	55	11
Prostate	66,070	1	9,060	8	1,297	7	90	6
Bladder	16,492	7	7,713	9	455	13	45	14
Head and Neck	19,429	6	5,401	10	872	9	87	7
Kidney	14,705	9	4,960	11	569	12	59	10
Brain	7,122	15	4,871	12	1,843	4	77	8
Uterine	14,361	11	4,150	13	305	15	43	15
Ovarian	5,320	16	3,935	14	596	10	50	13
Skin	16,449	8	2,125	15	1,676	5	120	5
Thyroid	13,109	12	465	16	289	16	26	16
Testicular	2,752	17	129	17	103	17	1	17

Table 37 - Rankings in terms of incidence and mortality according to the various organs in France.

For more information:
Cancer Sheet
Stomach and Esophageal

Figure 47 illustrates the correlation between the number of publications presented between 2015 and 2019 (x-axis), the number of trials opened over the same period (y-axis), and the number of deaths estimated in 2020 (size of the bubble). The research effort for hematology is the most prominent, with the greatest number of publications and clinical trials. This result is hardly surprising, as France is historically very involved in research on hematology. The large numbers of deaths attributable to lung and colorectal cancers are also noteworthy. Breast cancer represents a large number of publications and clinical studies, despite only ranking 4th in terms of mortality.

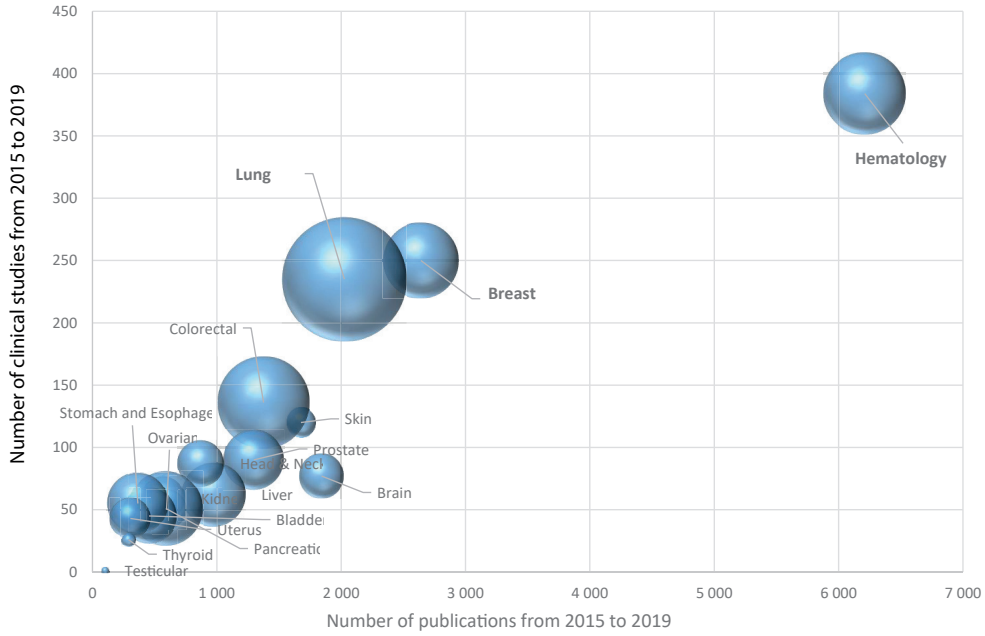


Figure 47 - Link between publications, clinical studies, and mortality in France.

Figure 48 provides the same graph but without Hematology, Breast, and Lung cancers.

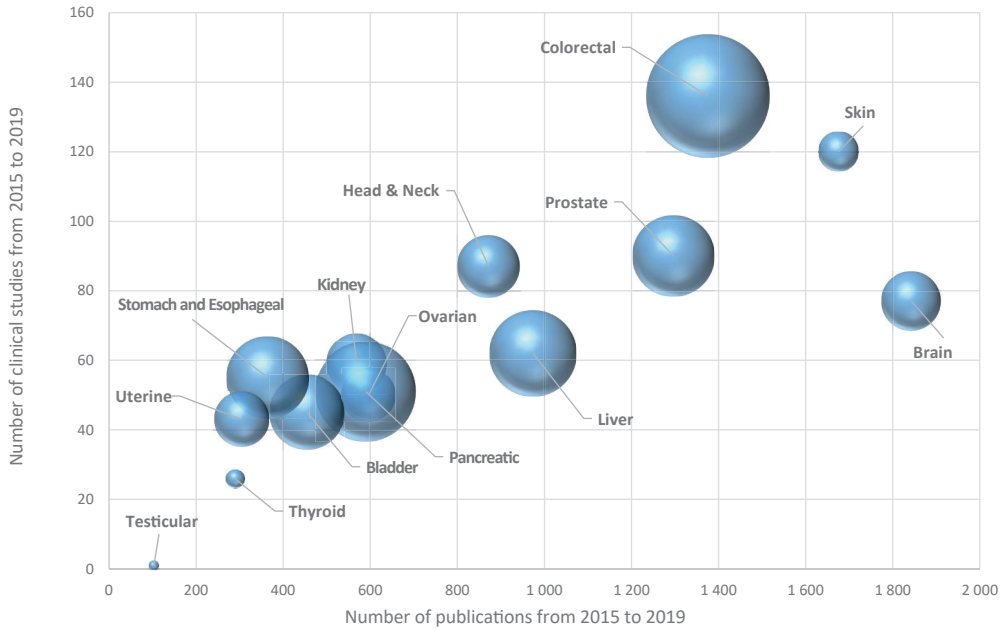


Figure 48 - Link between publications, clinical studies, and mortality in France, excluding hematology, breast, and lung cancers.

There is a significant research effort for both brain and skin cancers, despite ranking in 12th and 15th place respectively in terms of mortality. Colorectal cancer, which ranks second in terms of mortality, also benefits from a major research effort. While liver, prostate, and esophageal cancers have roughly equivalent mortalities, the research effort differs significantly according to the 3 sites, particularly in terms of scientific publications.

This finding is not specific to France. The analysis of these same data at the global level provides more or less the same results. Some studies, carried out in other countries, have even shown that there is not necessarily a link between the funding granted and mortality [13,14].

VI Conclusion

The analyses presented in this report show that, despite the rapid rise of certain countries such as China, South Korea, and Canada, France remains very well positioned in terms of its scientific production in the field of oncology. In 40 years, France has gone from 5th to 7th worldwide across all categories combined, from 4th to 9th worldwide for biomedical research, but has only dropped 2 places with regard to oncology, from 5th to 7th. It is equally important to note the significant increase in the impact of oncology-related publications – much higher than that of other categories: 2.44 for oncology vs. 1.70 for biomedical research over the last period in question. The significant contribution made by CHU/CH, having co-authored 56% of publications for all cancer sites combined, is also of note. An organ-by-organ analysis shows that CHU are deeply involved in research on hematology and the vast majority of solid tumors, as are CLCC in breast cancer research.

Likewise, the analysis of ClinicalTrials data shows that France remains very attractive when it comes to opening studies, particularly in the field of oncology, as France is responsible for 1/10 studies on cancer launched worldwide. Once again, it is important to consider the recent positioning of China and Spain in years to come. The analysis of SIGREC data also allowed us to take a better look at inclusions: more than 300,000 inclusions only taking into account those involved in interventional studies sponsored by Healthcare Establishments, a number of active studies that has increased by 50% in 10 years, a patient count that has increased by 23%, and a number of Phase I/II studies that has grown significantly, with the number of patients included in Phases I/II having increased by 65% between 2010 and 2019. However, this analysis does not take into account observational studies (registries, cohorts, clinico-biological databases, etc.), the number of which has greatly increased in recent years. These studies are just as essential, as they aim to better understand diseases, monitor patients' conditions, and prevent relapses. These studies, mainly carried out by Healthcare Establishments and CHU in particular, reflect their positioning, between basic research, clinical research, and patient care. Yet these studies are difficult to fund as they do not fall within the criteria of many calls for projects.

There are, however, some points that particularly warrant attention:

- France's global positioning varies greatly from one cancer site to another; 6th place worldwide for brain cancer, 7th place for hematological cancers, 8th place for lung cancer, 10th place for breast or colorectal cancers, and 13th place for esophageal cancer.
- The analysis of sponsorship activities shows an overall decrease in the field of oncology: between 2010 and 2014, oncology represented around 30% of active studies and 20% of inclusions, while between 2015 and 2019 it still represented 30% of active studies but only 14% of inclusions. This result can be explained in part by the development of Phases I/II. However, the evolution between CHU/CH and CLCC is seemingly very different. The number of active interventional studies sponsored by CHU/CH and the inclusions in these studies changed very little between 2010 and 2019. The role of interventional research on oncology in CHU/CH should be considered in order to quickly identify any obstacles observed.
- The use of specific methods, such as radiotherapy or brachytherapy, may limit the opening of studies to certain centers and thus reduce access to certain patients.
- There is strong heterogeneity between regions: by comparing the number of inclusions of patients included in studies on cancer to the total number of inclusions and to the population, ratios of 1 to 3 are observed. Even if the incidences of different cancers vary from one region to another, how can such differences be explained? The healthcare offer is mixed, as the number of CHU and CLCC varies from one region to another. The costs of healthcare and teaching as well as the number of university hospital staff also vary from one region to another.
- Finally, there does not appear to be a clear correlation between research effort (measured by the number of publications and clinical studies) and the severity of the cancer (measured by incidence and mortality). This finding is not specific to France, as same trends are observed at the global level and in other countries. This result is nonetheless puzzling... Funding earmarked for certain pathologies with a high incidence and/or mortality rate could be considered.

We hope that this assessment, carried out over the past 10 years, will make it possible to better prepare for the next 10 years, in particular within the framework of the 10-year cancer strategy presented in February 2021 to the French President. The first priority is to improve prevention (40% of cancers could be avoided if we adopted healthier lifestyles), the second is to limit the sequelae of the disease and improve patients' quality of life during and after treatment, and the last is to step up the fight against cancers with a poor prognosis. These 3 major challenges must also be assessed in terms of research, which has been widely underlined by the President and the Director General of the INCa. This report paints a picture of oncology research before the launch of the 10-year cancer strategy, and can also serve as a guide for decision-makers in order to promote oncology research in France and correct certain points we identified that warrant further attention.

VII Data and methods

The results of this report are based on data from the following sources:

For clinical trials:

ClinicalTrials.gov: Clinical trials registry maintained by the National Library of Medicine (NLM) at the National Institutes of Health (NIH) – an agency of the United States government. Data are reported by the main investigators and sponsors ("Sponsor/Collaborator") of clinical trials from 208 countries around the world. ClinicalTrials.gov data updated in March 2020.

SIGREC: System for the Identification and Management of Research and Clinical Trials – a tool that makes it possible to identify the data necessary to produce the indicators used by the French Directorate General of Healthcare Provision (DGOS) of the French Ministry of Solidarity and Health to calculate credits under the Missions for Education, Research, Reference and Innovation (MERRI) model. Data are reported by all Healthcare Establishments under the MERRI system (CHU, CLCC, CH, and Clinics). Data collected following the September 2020 export (clinical trials through to 2019).

For scientific publications:

Data from the international and multidisciplinary **Web of Science** (WoS) database by Clarivate Analytics. The indicators were calculated using data consolidated on **InCites** – an analytical tool by Clarivate Analytics that allows for the aggregation of production and citation statistics according to countries, organizations, and categories. These same data were used for cartographic analyses via **VOSviewer** [15] – a text mining and network mapping tool developed by the Center for Science and Technology Studies (CWTS) at Leiden University.

The dataset used corresponds to the WoS database update of December 2020.

A

Data and methods: ClinicalTrials.gov

The sponsor of a study registers a series of information on ClinicalTrials.gov including the pathology, procedure, title, description, and design of the trial, eligibility criteria, countries, and contact details for the various centers in which the clinical trial is carried out. It also specifies the sources of funding for the trial, which are listed as 1 of 4 categories: "NIH", "Other U.S. Federal agency", "Industry" and "All others (individuals, universities, organizations)".

Data was collected via the ClinicalTrials.gov search engine data export. This export concerns all studies, whether observational or interventional, recorded as having started between 2010 and 2019 (Study Start: From 01/01/2010 To 12/31/2019), for all sponsors, all statuses, and all phases combined for the key term "cancer" under "Condition or disease".

Geographical scope:

- For the section on "Cancer's positioning in clinical trials worldwide", no geographic restrictions were applied. We therefore gathered all the studies registered on ClinicalTrials.gov that met the filter criteria listed above.
- For the sections on "France's positioning in the world" and "France's positioning in Europe", we used an export of studies from each country that featured in the Top 10 Worldwide or European ranking at least once, for a year, from 2010 to 2019. The pre-export identification of these studies was carried out using the "Studies on Map" function by applying our analytical filters, but this time for each year from 2010 to 2019. Once these countries were identified, the country was selected from the "Country" field under "Locations", which made it possible to view all studies on cancer registered on ClinicalTrials.gov where the country was either a sponsor or a participant.
- For the "Sponsorship in France" section, we exported studies with "France" set as the "Country". CHU/CH, CLCC, Industrialists, Academic institutions ("INSERM"; "Learned Societies"; "Associations"; "Universities") and other Healthcare Establishments ("FEHAP" [French Federation of Non-Profit Private Hospitals]; "Clinics") were identified post-export by inputting an address under "Sponsor/Collaborator". In the case where there were several entities for this field, the first was designated as the sponsor.

Types of clinical studies:

- Studies were distinguished by their typology by selecting "Interventional" and/or "Observational" under "Study type". It should be noted that the definition of an interventional study per ClinicalTrials is not identical to the definition given by French regulations. Certain studies may therefore be considered as interventional according to French regulations and observational according to ClinicalTrials, and vice versa.
- The source of funding for these studies was identified under "Funder Type". 4 categories: "Industry"; "NIH"; "Other U.S. Federal Agency", and "All others". "NIH" stands for the National Institutes of Health, the U.S. government agency that oversees medical and biomedical research. "Other U.S. Federal agency" refers to federal agencies such as the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC, the main federal public health protection agency), or the United States Department of Veterans Affairs.

It should be noted that this field can have multiple values; consequently, a study can come under 1, 2, 3, or 4 associated funding categories. In contrast, an examination of the dataset used for our analysis tells us that globally, less than 1% of interventional studies on cancer come under 3 or 4 associated funding categories, and around 20% of studies have a dual source of funding among these 4. In terms of interventional studies on cancer in France, these figures fall to 0.1% for studies with 3 or 4 funding sources (few or no "NIH" or "Other U.S. Federal agency" studies) and 10% for studies with dual "All others" and "Industry" funding.

Age groups:

The 3 "Child", "Adult", and "Senior" age groups were identified under the "Age" field as follows: if this field includes the key terms "Child" or "up to 18 years old", the study falls under the "Child" category; if the field includes the key term "Adult" without "up to 18 years old", the study falls under the "Adult" category; and finally, if the field contains the key term "Older Adult", the study falls under the "Senior" category.

Studies on pediatric cancer exclusively concern those for the "Child" age group. All those with a combined age group, i.e., "Child" + "Adult" (2 age brackets) or "Child" + "Adult" + "Senior" (no specific age group), are not counted as studies on pediatric cancer, as these 3 examples illustrate:

"Age" = "1 Year to 75 Years Old (Child, Adult, Older Adult)"
=> non-pediatric;

"Age" = "4 Years to 16 Years Old (Child)"
=> pediatric;

"Age" = "Up to 18 Years Old (Child, Adult)"
=> pediatric.

Cancer site: Cancers were distinguished by cancer site post-export based on the information specified under "Condition or disease". This categorization is based on a list of more than 350 key terms associated with more than 30 organs. List drawn up by the bibliographic teams of the CNCR and the Lille CHRU (Regional University Hospital Center), and submitted for validation by FHF Cancer experts.

B

Data and methods: SIGREC

The data used come from the last national export to date, i.e., November 10, 2020. For this analysis, we selected all studies:

- with "Yes" ticked under the mandatory field "Oncology";
- registered as interventional research (biomedical research, routine care, RIPH1, and RIPH2);
- with at least one inclusion over the period in question.

Each Establishment (sponsor or investigator) is defined by its FINESS number, its type (CHU, CLCC, CH, etc.), as well as the inclusions attained each year for each study.

A new study is a study that has received medical and regulatory authorizations, and can therefore be launched. The year in which it was registered with the authorities is considered the authorization year. This authorization year was generated, in two thirds of cases, using the date on which the study was registered with the competent authority. For the remaining third that did not have a registration date, a date was generated using the number under which the study was registered with the competent authorities.

A study having received DGOS funding is any study that was funded within the framework of a PHRC (Hospital Clinical Research Program), PHRIP (Nursing and Paramedical Research Program), PREPS (Healthcare System Performance Research Program), PREQHOS (Hospital Quality Research Program), PRME (Medico-Economic Research Program), PRT (Translational Research Program), or P-STIC (Cost-heavy Innovative Techniques Support Program) call for projects.A study is considered to be multi-centric if inclusions have been carried out in at least 2 declared centers.

Inclusions are not counted in the same way depending on whether they are "sponsor" inclusions or "investigator" inclusions. In the first case, all the inclusions of a study are counted for its sponsor establishment, whether they are its own inclusions or those carried out in the recruitment centers of other establishments. In the second case, only the inclusions of the institution's recruitment center are counted, whether or not it is the sponsor of the study.

C

Data and methods: Web of Science (WoS)

The various publication datasets were generated using queries in the Web Of Science from 2010 to 2019 ("PY" Publication Year field) according to the following criteria:

- Publication Type: "Article" (original article) and "Review" type documents that are part of the Web of Science Core Collection ™, including the Emerging Sources Citation Index (WoS ESCI), have been taken into account. The term "publications" used in the text refers only to these 2 types of documents.
- Geographical scope: Publications are often signed by several authors and several institutions. In this study, the indicators were calculated based on presence: a publication is attributed to a player (organization, country, etc.) if at least one researcher from this entity appears in the list of co-authors, regardless of position. Each publication is therefore counted as many times as there are players (organizations, countries, etc.). The authors of these scientific publications indicate their institutional affiliation through the addresses appearing in the publications ("AD" field in WoS). However, each organization can be referred to by a wide variety of names, including its components or multiple variants. The lack of standardization in the names of affiliations is detrimental to the visibility of the organizations' scientific production. All the names of an organization are grouped together under a single name ("OG" Organization-Enhanced field), making it easier to both find a publication and analyze the data.

In order to characterize scientific production on cancer in France, we compared it with its global equivalent, then focused on the positions of the institutions that contribute the most to medical cancer research: CHU/CH, Unicancer, INSERM, CNRS.

- For global data, no restrictions were applied to the address (AD) or Organization-Enhanced (OG) fields.
- For data specific to France, the address (AD) field must contain the key term "France".
- For data specific to a group of establishments, the Organization-Enhanced (OG) field must contain the "OG" of the various organizations constituting this group. As a result, establishments that do not have an "OG" assigned in WoS are not taken into account. It should also be noted that for establishments with an "OG", the exhaustiveness and accuracy of the unification of addresses are not equal for all organizations appearing in the WoS database. The "OG" used in the context of this analysis are provided in the Appendix.

Fact sheets

The analyses were carried out based on the publications indexed in the Web of Science. In this database, a category brings together all the specific oncology journals in the field of "Oncology". However, as oncology is a highly cross-cutting discipline, only one third of publications relating to studies on cancer are published in "Oncology" journals, with the remaining two thirds being published in specialist journals (focusing on neurology, pneumology, urology, etc.). In order to include all the publications, a query using key terms was necessary.

A WoS query was therefore set up for each cancer site, taking into account generic cancer-related key terms associated with the organ in question or key terms specific to the type of cancer analyzed. These various key terms were not identified using the Topic field as it uses KeyWords Plus, which are not sufficiently reliable. The query was based on 3 fields:

- The title of the publication ("TI" Title): for example, the term "Glioma" in the title.
- Author keywords ("AK"): for example, "Glioma" in the keywords.
- The name of specific journals ("SO" Publication Name): for example, Neuro-Oncology.

In the end, 25 queries were constructed by the CNCR Bibliometrics Unit, and submitted for validation to FHF Cancer.

D

Data and methods: InCites

The analyses on France's positioning are based on data provided by the InCites platform (Clarivate Analytics). On InCites, production can be analyzed according to 2 levels:

- The ESI (Essential Science Indicators) classification, which includes 22 major fields;
- The Web of Science Categories classification, which includes 254 fields. These fields can be re-aggregated to form a new classification. For example, the OECD classification (Frascati), which includes 6 major fields, including the "Medical & Health Sciences" field, which groups together the main WoS categories relating to Medicine.

The InCites platform allows for analyses by country, institution (Organization-Enhanced), category, and period. It provides numerous indicators:

- Number of documents: the number of articles and reviews recorded (in terms of presence) for the country or the type of establishment;
- Number of citations: the total number of citations attributed to the documents in question;
- CNCI (Category Normalized Citation Impact): the ratio between the number of citations observed and the number of citations expected (defined by the average number of citations of all documents of the same type, published in the same year, in the same category (Web of Science Category). A CNCI of 2 means that the documents analyzed are, on average, cited twice as often as the global average.
- Top 1% and Top 10% Citations: these indicators measure the share (in %) of articles of a player belonging to the Top 1% and the Top 10% of articles most cited at the international level. An article belongs to the Top 1% (and respectively the Top 10%) if it appears in the 1% of articles (and 10% respectively) most cited worldwide by adjusting for the year of publication and the Web of Science Category;
- International Collaboration: an article containing at least 2 addresses from different countries;
- Open Access: an article available in Open Access. This includes all types of Open Access;
- Corresponding Author: calculated based on the address of the Corresponding Author. Several Institutions can thus be assigned as the Corresponding Author for a single article. It measures the level of coordination between players.

E

Cartographic representation: VosViewer

Maps (collaborative networks) are produced using "VOSviewer" software. For each publication, a citation percentile (worldwide rank in terms of citations, adjusted for the year and category) was used to identify teams with a strong scientific impact in the field analyzed. To do so, all the publications in the field both classified in the Top 20% worldwide (20% of the most cited publications, adjusting for the year and category) and with at least one French address, were extracted from the Web Of Science in order to analyze collaborations.

For each cancer site, 2 distinct publication periods were analyzed: "2010-2014" and "2015-2019". In order to guarantee a reliable comparison between the different maps produced, each dataset has been identically configured in terms of its VOSviewer viewing options, with a maximum threshold of 25 authors per publication and a minimum threshold ranging from 2 to 12 publications per author according to the volume of publications for each cancer site. No thresholds were applied for the minimum number of citations per author.

The list of the main authors in terms of their number of publications in the Top 20% from 2010 to 2019 was drawn up using the top 10 authors with the greatest number of publications for each of the 3 periods ("2010-2014", "2015-2019", and "2010-2019") and on the condition that they have published at least 6 publications over the period concerned.

F

List of the 10 publications with the highest citation impact

This list is drawn up based on the citation percentiles. The percentile of an article is calculated by comparing the number of citations of said article to the citations of all articles published in the same year in the same Web of Science Category. Articles in the Top 1% are those with a percentile lower than or equal to 1; articles in the Top 10% are those with a percentile lower than or equal to 10. The 10 publications with the lowest percentile and with at least one French address in first or last position were selected from the period ranging from 2010 to 2019.

VIII List of tables

IX List of figures

X References

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[2] Stewart BW, Wild CP, editors. World cancer report 2014 – Lyon: International Agency for Research on Cancer; 2014: Accessible: https://publications.iarc.fr/Non-Series-Publications/World-cancer-Reports/World-cancer-Report-2014

[3] https://www.ClinicalTrials.gov/

[4] Missions for Education, Research, Reference and Innovation - MERRI - https://solidarites-sante.gouv.fr/systeme-de-sante-et-medico-social/recherche-et-innovation/l-innovation-et-la-recherche-clinique/merri

[5] Population estimates by region, sex, and age group - 1975 to 2021. https://www.insee.fr/fr/statistiques/1893198

[6] Web of Science Core Collection - https://clarivate.com/webofsciencegroup/solutions/web-of-science-core-collection/

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[8] Essential Science Indicators - https://incites.help.clarivate.com/Content/Research-Areas/essential-science-indicators.htm

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[10] OECD Category Schema - https://incites.help.clarivate.com/Content/Research-Areas/oecd-category-schema.htm

[11] MeSH Browser: Neoplasms MeSH Descriptor - https://meshb.nlm.nih.gov/record/ui?ui=D009369

[12] International Agency for Research on Cancer - https://gco.iarc.fr/today/online-analysis-table

[13] Carter AJ, Delarosa B, Hur H. An analysis of discrepancies between United Kingdom cancer research funding and societal burden and a comparison to previous and United States values. Health Res Policy Syst. 2015 Nov 2;13:62. PMID: 26526609

[14] Coronado AC, Finley C, Badovinac K, Han J, Niu J, Rahal R. Discrepancies between Canadian cancer research funding and site-specific cancer burden: a spotlight on ten disease sites. Curr Oncol. 2018 Oct;25(5):338-341. PMID: 30464683.

[15] VOSviewer: Visualizing scientific landscapes - https://www.vosviewer.com/

XI Appendices

Appendix 1: Organization-Enhanced list

FULL NAME	TYPE
Centre Hospitalier de Pau	CH
Centre Hospitalier de Versailles	CH
Centre Hospitalier Departemental Vendee	CH
Centre Hospitalier du Mans	CH
Centre Hospitalier Intercommunal de Creteil	CH
Centre Hospitalier Sainte-Anne	CH
Hospital Chi of Poissy Saint Germain	CH
Assistance Publique Hopitaux Paris (APHP)	CHU
Assistance Publique-Hopitaux de Marseille	CHU
Centre Hospitalier Regional d'Orleans	CHU
Centre Hospitalier Universitaire d'Angers	CHU
CHR Metz-Thionville	CHU
CHU Amiens	CHU
CHU Besancon	CHU
CHU Bordeaux	CHU
CHU Brest	CHU
CHU Clermont Ferrand	CHU
CHU de Caen NORMANDIE	CHU
CHU de Montpellier	CHU
CHU de Nancy	CHU
CHU de Nantes	CHU
CHU de Nimes	CHU
CHU de Reims	CHU
CHU de Rouen	CHU
CHU de St Etienne	CHU
CHU de Toulouse	CHU
CHU Dijon Bourgogne	CHU
CHU Grenoble Alpes	CHU
CHU Guadeloupe	CHU
CHU Lille	CHU
CHU Limoges	CHU
CHU Lyon	CHU
CHU Martinique	CHU
CHU Nice	CHU
CHU Poitiers	CHU
CHU Rennes	CHU
CHU Reunion	CHU
CHU Strasbourg	CHU
CHU Tours	CHU
Centre Antoine Lacassagne	CLCC
Centre Eugene Marquis	CLCC
Centre Francois Baclesse	CLCC
Centre Georges-Francois Leclerc	CLCC
Centre Henri Becquerel	CLCC
Centre Jean Perrin	CLCC
Centre Leon Berard	CLCC
Centre Oscar Lambret	CLCC
Centre Paul Strauss	CLCC
Gustave Roussy	CLCC
Institut Bergonie	CLCC
Institut Claudius Regaud	CLCC
Institut Curie	CLCC
Institut de Cancerologie de la Loire	CLCC
Institut de cancerologie de Lorraine (ICL)	CLCC
Institut Jean Godinot	CLCC
Institut Paoli-Calmette (IPC)	CLCC
Institut Regional du Cancer Montpellier / Val d'Aurelle (ICM)	CLCC
Rene Huguenin Hospital	CLCC
Institut de Cancerologie de l'Ouest (ICO)	CLCC
UNICANCER	CLCC

FULL NAME	TYPE
Aix-Marseille Universite	University
Avignon Universite	University
CY Cergy Paris Universite	University
Normandie Universite	University
Picardie Universites	University
Sorbonne Universite	University
Universite Bordeaux-Montaigne	University
Universite Bourgogne Franche-Comte (ComUE)	University
Universite Catholique de Lille	University
Universite Claude Bernard Lyon 1	University
Universite Clermont Auvergne & Associes	University
Universite Clermont Auvergne (UCA)	University
Universite Cote d'Azur	University
Universite d'Angers	University
Universite d'Artois	University
Universite de Bordeaux	University
Universite de Bourgogne	University
Universite de Bretagne Occidentale	University
Universite de Bretagne Occidentale	University
Universite de Caen Normandie	University
Universite de Franche-Comte	University
Universite de Haute-Alsace (UHA)	University
Universite de La Rochelle	University
Universite de Lille	University
Universite de Limoges	University
Universite de Lorraine	University
Universite de Montpellier	University
Universite de Nantes	University
Universite de Nimes	University
Universite de Orleans	University
Universite de Paris	University
Universite de Pau et des Pays de l'Adour	University
Universite de Picardie Jules Verne (UPJV)	University
Universite de Poitiers	University
Universite de Reims Champagne-Ardenne	University
Universite de Rennes 1	University
Universite de Rouen Normandie	University
Universite de Savoie	University
Universite de Strasbourg	University
Universite de Technologie de Belfort-Montbeliard (UTBM)	University
Universite de Technologie de Compiegne	University
Universite de Technologie de Troyes	University
Universite de Toulon	University
Universite de Toulouse	University
Universite de Toulouse - Jean Jaures	University
Universite de Tours	University
Universite de Valenciennes et du Hainaut-Cambresis	University
Universite de Versailles Saint-Quentin-En-Yvelines	University
Universite d'Evry-Val-d'Essonne	University
Universite du Littoral-Cote-d'Opale	University
Universite du Maine	University
Universite Grenoble Alpes (UGA)	University
Universite Gustave-Eiffel	University
Universite Jean Monnet	University
Universite Jean Moulin Lyon 3	University
Universite Le Havre Normandie	University
Universite Lyon 2	University
Universite Pantheon-Sorbonne	University
Universite Paris 13	University
Universite Paris 2 Pantheon-Assas	University
Universite Paris Nanterre	University
Universite Paris Saclay	University
Universite Paris-Dauphine	University
Universite Paris-Est-Creteil-Val-de-Marne (UPEC)	University
Universite Paris-VIII	University
Universite Paul-Valery	University
Universite Perpignan Via Domitia	University
Universite Rennes 2	University
Universite Sorbonne Nouvelle - Paris 3	University
Universite Toulouse 1 Capitole	University
Universite Toulouse III - Paul Sabatier	University
Universites de Strasbourg Etablissements Associes	University
University Paris	University

Appendix 2: Web of Science query list

Organ	Query
Breast	((TI=(Breast OR mammary OR BRCA) OR AK=(breast OR mammary OR BRCA))) AND (Ti=(cancer OR carcinoma OR neoplasm* OR tumor* OR antitumor OR tumour* OR malignan* OR radiation OR irradiation OR radiotherapy OR "hormonal therapy" OR "hormone therapy" OR metasta* OR carcinogen*) OR AK=(cancer OR carcinoma OR neoplasm* OR tumor* OR antitumor OR tumour* OR malignan* OR radiation OR irradiation OR radiotherapy OR "hormonal therapy" OR "hormone therapy" OR metasta* OR carcinogen*)) OR TI=("ductal carcinoma" OR "lobular carcinoma") OR AK=("ductal carcinoma" OR "lobular carcinoma") OR SO=(BREAST CANCER OR BREAST CANCER BASIC "AND" CLINICAL RESEARCH OR BREAST CANCER RESEARCH OR BREAST CANCER RESEARCH "AND" TREATMENT)
Lung	(Ti=(pulmonary OR lung OR pleural OR bronch* OR mediastinal OR "Pleural Effusion" OR respiratory OR "Respiratory Tract") OR AK=(pulmonary OR lung OR pleural OR bronch* OR mediastinal OR "Pleural Effusion" OR respiratory OR "Respiratory Tract")) AND (Ti=(neoplasm* OR cancer OR carcinoma OR adenocarcinoma OR tumor* OR tumour* OR maligna* OR metasta* OR carcinogen* OR radiation OR immunotherapy OR chemotherapy OR sarcoma) OR AK=(neoplasm* OR cancer OR carcinoma OR adenocarcinoma OR tumor* OR tumour* OR maligna* OR metasta* OR carcinogen* OR radiation OR immunotherapy OR chemotherapy OR sarcoma)) OR Ti= (mesothelioma OR "pulmonary chondroma" OR lymphangioleiomyomatosis OR NSCLC OR SCLC) OR AK=(mesothelioma OR "pulmonary chondroma" OR lymphangioleiomyomatosis OR NSCLC OR SCLC) OR SO=(LUNG CANCER)
Colorectal	Ti=("colorectal neoplasms" OR "colonic neoplasms" OR "rectal neoplasms" OR "sigmoid neoplasms" OR "anus neoplasms" OR "colorectal carcinoma" OR "anal neoplasms" OR "colorectal cancer" OR "colonic cancer" OR "rectal cancer" OR "sigmoid cancer" OR "anus cancer" OR "anal cancer" OR "colon cancer" OR "rectum cancer" OR "rectum neoplasms" OR "colorectal carcinogen*" OR "colonic carcinoma" OR "anal carcinoma" OR "rectal carcinoma" OR "colorectal tumor*" OR "colonic tumor*" OR "rectal tumor*" OR "sigmoid tumor*" OR "anal tumor*" OR "colorectal tumour*" OR "rectal tumour*" OR "colonic tumour*" OR "anal tumour*" OR "sigmoid tumour*" OR "colorectal metasta*" OR "colonic metasta*" OR "rectal metasta*" OR "anal metasta*" OR "sigmoid metasta" OR "colorectal malignan*" OR "colonic malignan*" OR "rectal malignan*" Or "sigmoid malignan*" OR "anal malignan*") OR AK=("colorectal neoplasms" OR "colonic neoplasms" OR "rectal neoplasms" OR "sigmoid neoplasms" OR "anus neoplasms" OR "colorectal carcinoma" OR "anal neoplasms" OR "colorectal cancer" OR "colonic cancer" OR "rectal cancer" OR "sigmoid cancer" OR "anus cancer" OR "anal cancer" OR "colon cancer" OR "rectum cancer" OR "rectum neoplasms" OR "colorectal carcinogen*" OR "colonic carcinoma" OR "anal carcinoma" OR "rectal carcinoma" OR "colorectal tumor*" OR "colonic tumor*" OR "rectal tumor*" OR "sigmoid tumor*" OR "anal tumor*" OR "colorectal tumour*" OR "rectal tumour*" OR "colonic tumour*" OR "anal tumour*" OR "sigmoid tumour*" OR "colorectal metasta*" OR "colonic metasta*" OR "rectal metasta*" OR "anal metasta*" OR "sigmoid metasta" OR "colorectal malignan*" OR "colonic malignan*" OR "rectal malignan*" Or "sigmoid malignan*" OR "anal malignan*") OR Ti=("gardner syndrome" OR CRC OR "Lynch syndrome" OR "adenomatous polyposis" OR "familial polyposis coli") OR AK=("gardner syndrome" OR CRC OR "Lynch syndrome" OR "adenomatous polyposis" OR "familial polyposis coli")
Skin	(Ti=("sweat gland" OR "sebaceous gland" OR epidermoid OR "actinic keratosis" OR "basal cell" OR cutaneous OR keratosis OR mucoepidermoid OR "squamous cell" OR warts) OR AK=("sweat gland" OR "sebaceous gland" OR epidermoid OR "actinic keratosis" OR "basal cell" OR cutaneous OR keratosis OR mucoepidermoid OR "squamous cell" OR warts)) AND (Ti=(cancer OR carcinoma Or neoplasm OR tumor* OR tumour* OR malignan* OR chemotherapy) OR AK=(cancer OR carcinoma Or neoplasm OR tumor* OR tumour* OR malignan* OR chemotherapy)) OR Ti=("skin cancer*" OR "skin neoplasm*" OR "skin carcinoma" OR "skin tumor*" OR "skin tumour*") OR AK=("skin cancer*" OR "skin neoplasm*" OR "skin carcinoma" OR "skin tumor*" OR "skin tumour*") OR Ti=(syringoma OR melanoma OR Acanthoma OR "Muir-Torre Syndrome" OR mastocytoma OR porocarcinoma OR vemurafenib OR verrucous OR "Bowen's disease") OR AK=(syringoma OR melanoma OR Acanthoma OR "Muir-Torre Syndrome" OR mastocytoma OR porocarcinoma OR vemurafenib OR verrucous OR "Bowen's disease") OR SO=(MELANOMA RESEARCH)

Brain	(Ti=(brain OR pituitary OR mening* OR "central nervous system" OR cerebellar OR "Cerebral Ventricle" OR "Choroid Plexus" OR Infratentorial OR supratentorial OR hypothalamic OR cerebellum OR pontine OR CNS OR cerebral OR pineal OR intracranial) OR AK=(brain OR pituitary OR mening* OR "central nervous system" OR cerebellar OR "Cerebral Ventricle" OR "Choroid Plexus" OR Infratentorial OR supratentorial OR hypothalamic OR cerebellum OR pontine OR CNS OR cerebral OR pineal OR intracranial)) AND (Ti=(neoplasm OR neoplastic OR cancer OR adenoma OR tumor* OR tumour* OR malignan* OR metasta* OR radiotherapy OR chemotherapy OR radiation OR irradiation OR radiosurgery OR carcinogen* OR carcinoma* OR immunotherapy OR sarcoma) OR AK=(neoplasm OR neoplastic OR cancer OR adenoma OR tumor* OR tumour* OR malignan* OR metasta* OR radiotherapy OR chemotherapy OR radiation OR irradiation OR radiosurgery OR carcinogen* OR carcinoma* OR immunotherapy OR sarcoma)) OR Ti=(Glioma* OR Glioblastoma* OR Meningioma* OR neuro-oncol* OR leptomeningeal OR medulloblastoma* OR astrocytoma* OR "central neurocytoma" OR pinealoma* OR hemangioblastoma OR OLIGODENDROGLIOMA* OR EPENDYMOMA OR gliosarcoma OR"vestibular schwannoma" OR oligoastrocytoma OR "glomus jugulare tumor") OR AK=(Glioma* OR Glioblastoma* OR Meningioma* OR neuro-oncol* OR leptomeningeal OR medulloblastoma* OR astrocytoma* OR "central neurocytoma" OR pinealoma* OR hemangioblastoma* OR OLIGODENDROGLIOMA* OR EPENDYMOMA OR gliosarcoma OR "vestibular schwannoma" OR oligoastrocytoma OR "glomus jugulare tumor") OR SO=(BRAIN TUMOR PATHOLOGY OR BRAIN TUMORS OR NEURO ONCOLOGY)
Prostate	(TI=(prostat* OR Castration Resistant) OR AK=(Prostat* OR Castration Resistant)) AND (Ti=(cancer OR adenoma OR carcinoma OR adenocarcinoma OR neoplasm* OR malignan* OR tumor* OR tumour* OR radiotherapy OR brachytherapy OR "androgen deprivation therapy" OR "radiation therapy" OR metasta* OR carcinogen*) OR AK=(cancer OR adenoma OR carcinoma OR adenocarcinoma OR neoplasm* OR malignan* OR tumor* OR tumour* OR radiotherapy OR brachytherapy OR "androgen deprivation therapy" OR "radiation therapy" OR metasta* OR carcinogen*)) OR SO=(PROSTATE CANCER OR CLINICAL GENITOURINARY CANCER OR PROSTATE CANCER "AND" PROSTATIC DISEASES)
Liver	Ti=("liver cancer" OR "liver carcinoma" OR "liver neoplasm" OR "liver tumour*" OR "liver tumor*" OR "liver adenoma" OR "liver metasta*" OR "liver carcinogen*" OR "liver malignan*") OR AK=("liver cancer" OR "liver carcinoma" OR "liver neoplasm" OR "liver tumour*" OR "liver tumor*" OR "liver adenoma" OR "liver metasta*" OR "liver carcinogen*" OR "liver malignan*") OR Ti=("hepatic cancer" OR "hepatic carcinoma" OR "hepatic neoplasms" OR "hepatic tumour*" OR "hepatic tumor" OR "hepatic adenoma" OR "hepatic metasta" OR "hepatic carcinogen*" OR "hepatic malignan*") OR AK=("hepatic cancer" OR "hepatic carcinoma" OR "hepatic neoplasms" OR "hepatic tumour*" OR "hepatic tumor" OR "hepatic adenoma" OR "hepatic metasta" OR "hepatic carcinogen*" OR "hepatic malignan*") OR TI=(hepatoma OR hepatosplenic OR hepatoblastoma OR "hepatocellular carcinoma") OR AK=(hepatoma OR hepatosplenic OR hepatoblastoma OR "hepatocellular carcinoma") OR SO=(HEPATIC ONCOLOGY OR LIVER CANCER)
Head and Neck	((Ti=("head and neck" OR oral OR retinal OR retinoblastoma OR facial OR mouth OR tracheal OR nasal OR "salivary gland" OR eyelids OR gingival OR lip OR palatal OR palate OR tongue OR uvula OR parotid OR "sublingual gland" OR "submandibular gland" OR sinonasal OR otorhinolaryngologic* OR laryngeal OR hypopharyngeal OR pharyngeal OR "paranasal sinus" OR oropharyngeal OR hypopharynx OR oropharynx OR Pharynx OR larynx OR otorhinolaryngeal OR ear OR auricular OR "ear auricle" OR nose OR nasopharyngeal OR nasopharynx OR tonsillar OR tonsil OR laryngopharyngeal) OR AK=("head and neck" OR oral OR retinal OR retinoblastoma OR facial OR mouth OR tracheal OR nasal OR "salivary gland" OR eyelids OR gingival OR lip OR palatal OR palate OR tongue OR uvula OR parotid OR "sublingual gland" OR "submandibular gland" OR sinonasal OR otorhinolaryngologic* OR laryngeal OR hypopharyngeal OR pharyngeal OR "paranasal sinus" OR oropharyngeal OR hypopharynx OR oropharynx OR Pharynx OR larynx OR otorhinolaryngeal OR ear OR auricular OR "ear auricle" OR nose OR nasopharyngeal OR nasopharynx OR tonsillar OR tonsil OR laryngopharyngeal)) AND (Ti=(cancer OR carcinoma OR neoplasms) OR AK=(cancer OR carcinoma OR neoplasms)))
Ovarian	((Ti=(ovarian OR ovary) OR AK=(ovarian OR ovary)) AND (Ti=(neoplasm* OR cancer OR teratoma OR tumor* OR tumour* OR carcinoma OR malignan* OR metasta*) OR AK=(neoplasm* OR cancer OR teratoma OR tumor* OR tumour* OR carcinoma OR malignan*OR metasta*)) OR Ti=(krukenberg OR "granulosa cell tumor" OR luteoma OR arrhenoblastoma) OR AK=(krukenberg OR "granulosa cell tumor" OR luteoma OR arrhenoblastoma))
Pancreatic	(Ti=(pancreas OR pancreatic OR pancreatitis) OR AK=(pancreas OR pancreatic OR pancreatitis)) AND (Ti=(cancer OR neoplasm* OR tumor* OR tumour* OR adenocarcinoma OR metasta* OR malignan*) OR AK=(cancer OR neoplasm* OR tumor* OR tumour* OR adenocarcinoma OR metasta* OR malignan*)) OR TI=(glucagonoma OR somatostatinoma) OR AK=(glucagonoma OR somatostatinoma)
Kidney	Ti=("kidney neoplasms" OR "kidney carcinoma" OR "renal carcinoma" OR "renal cancer" OR "kidney cancer" OR "renal neoplasms" OR "ureteral neoplasms" OR "ureteral cancer" OR "transitional cell carcinoma" OR "transitional cell cancer" OR "renal cell carcinoma" OR "renal cell cancer" OR "kidney tumor*" OR "kidney tumour*" OR "renal tumor*" OR "renal tumour*" OR "ureteral tumor*" OR "ureteral tumour*) OR AK=("kidney neoplasms" OR "kidney carcinoma" OR "renal carcinoma" OR "renal cancer" OR "kidney cancer" OR "renal neoplasms" OR "ureteral neoplasms" OR "ureteral cancer" OR "transitional cell carcinoma" OR "transitional cell cancer" OR "renal cell carcinoma" OR "renal cell cancer" OR "kidney tumor*" OR "kidney tumour*" OR "renal tumor*" OR "renal tumour*" OR "ureteral tumor*" OR "ureteral tumour*") OR Ti=("Denys-Drash" OR mesonephroma OR nephroblastoma OR Wilms OR PRCC) OR AK=("Denys-Drash" OR mesonephroma OR nephroblastoma OR Wilms OR PRCC)

Organ	Query
Bone	(Ti=(bone OR bony OR spinal OR ewing OR osteo* OR skull OR "skull base" OR Nose OR orbital OR jaw OR mandibular OR maxillary OR palatal OR mandible OR maxilla OR "femur head" OR "femur neck") OR AK=(bone OR bony OR spinal OR ewing OR osteo* OR skull OR "skull base" OR Nose OR orbital OR jaw OR mandibular OR maxillary OR palatal OR mandible OR maxilla OR "femur head" OR "femur neck")) AND(TI=(neoplasms OR metasta* OR tumor* OR tumour* OR sarcoma) OR AK=(neoplasms OR metasta* OR tumor* OR tumour* OR sarcoma)) OR Ti=(osteosarcoma OR chordoma OR adamantinoma) OR AK=(osteosarcoma OR chordoma OR adamantinoma) OR Ti=("bone cancer" OR "skull base cancer" OR "nose cancer" OR "jaw cancer" OR "skull cancer" OR "femur head cancer" OR "femur neck cancer" OR "maxillary cancer" OR "mandible cancer" OR "mandibular cancer" OR "palatal cancer" OR "orbital cancer" OR "maxilla cancer") OR AK=("bone cancer" OR "skull base cancer" OR "nose cancer" OR "jaw cancer" OR "skull cancer" OR "femur head cancer" OR "femur neck cancer" OR "maxillary cancer" OR "mandible cancer" OR "mandibular cancer" OR "palatal cancer" OR "orbital cancer" OR "maxilla cancer")
Thyroid	(Ti=(thyroid OR parathyroid) OR AK=(thyroid OR parathyroid)) AND (Ti=(cancer OR neoplasms OR carcinoma OR metasta* OR tumour* OR tumor* OR malignan* OR carcinog*) OR AK=(cancer OR neoplasms OR carcinoma OR metasta* OR tumour* OR tumor* OR malignan* OR carcinog*)) OR Ti=("papillary carcinoma") OR AK=("papillary carcinoma")
Stomach and Esophageal	(Ti=(esophagus OR esophageal OR oesophagus OR oesophageal) OR AK=(esophagus OR esophageal OR oesophagus OR oesophageal)) AND (Ti=(cancer OR neoplasm OR carcinoma OR adenocarcinoma OR Barrett) OR AK=(cancer OR neoplasm OR carcinoma OR adenocarcinoma OR Barrett)) OR ((Ti=(stomach OR gastric) OR AK=(stomach OR gastric)) AND (Ti=(cancer OR neoplasms OR adenocarcinoma OR carcinoma OR carcinogen*) OR AK=(cancer OR neoplasms OR adenocarcinoma OR carcinoma OR carcinogen*)) OR Ti=(linitis plastica) OR AK=(linitis plastica))
Bladder	((Ti=("urinary bladder" OR bladder NOT "gall bladder") OR AK=("urinary bladder" OR bladder NOT "gall bladder")) AND (Ti=(cancer OR neoplasms OR tumo* OR carcinoma) OR AK=(cancer OR neoplasms OR tumo* OR carcinoma)) OR Ti=("Urothelial carcinoma") OR AK=("Urothelial carcinoma"))
Uterine	((Ti=(uterus OR uterine OR endometrial OR "uterine cervical" OR cervix OR endometrioid OR endometrium OR womb) OR AK=(uterus OR uterine OR endometrial OR "uterine cervical" OR cervix OR endometrioid OR endometrium OR womb)) AND (Ti=(cancer OR neoplasms OR carcinoma OR adenocarcinoma OR sarcoma OR malignan*) OR AK=(cancer OR neoplasms OR carcinoma OR adenocarcinoma OR sarcoma OR malignan*)) OR Ti=(choriocarcinoma) OR AK=(choriocarcinoma))
Testicular	(Ti=(testicular OR testis OR testicle) OR AK=(testicular OR testis OR testicle)) AND (Ti=(cancer OR carcinoma OR neoplasms OR sarcoma OR seminoma OR tumo*) OR AK=(cancer OR carcinoma OR neoplasms OR sarcoma OR seminoma OR tumo*))

Hematology	TI=(CMML) OR TI=(Angioimmunoblastic) OR TI=(Lymphoplasmacytic) OR TI=(MYD88 mutation) OR TI=(Abexinostat) OR TI=(Acalabrutinib) OR TI=(Alemtuzumab) OR TI=(AML) OR TI=(Angioimmunoblastic) OR TI=(Azacitidine) OR TI=(Bendamustine) OR TI=(Bing-Neel) OR TI=(Biphenotypic) OR TI=(Blast Crisis) OR TI=(Bone Marrow Transplantation) OR TI=(Bortezomib) OR TI=(Brentuximab vedotin) OR TI=(Burkitt) OR TI=(Carfilzomib) OR TI=(Carmustine) OR TI=(CLL) OR TI=(Clofarabine) OR TI=(CMML) OR TI=(Coltuximab) OR TI=(coltuximab ravtansine) OR TI=(Copanlisib) OR TI=(Daratumumab) OR TI=(Dasatinib) OR TI=(Decitabine) OR TI=(DLBCL) OR TI=(Elotuzumab) OR TI=(Erythroid) OR TI=(Extranodal) OR TI=(Fludarabine) OR TI=(Gemtuzumab ozogamicin) OR TI=(Hematologic) OR TI=(Hematopoietic) OR TI=(Hematopoietic Cell Transplantation) OR TI=(Hematopoietic Stem Cell Transplant) OR TI=(Hodgkin) OR TI=(Ibrutinib) OR TI=(Imatinib) OR TI=(Immunoblastic) OR TI=(Lenalidomide) OR TI=(Leucocythemia) OR TI=(Leukaemia) OR TI=(Leukemic) OR TI=(Lymphoblastic) OR TI=(Lymphocyte) OR TI=(Lymphocytic) OR TI=(lymphoplamsocytoma) OR TI=(Lymphoma) OR TI=(lymphomatoid) OR TI=(Lymphoplasmacytic) OR TI=(Mantle Cell) OR TI=(Megakaryoblastic) OR TI=(Monoblastic) OR TI=(Myeloblastic) OR TI=(Myelodysplastic) OR TI=(Myelofibrosis) OR TI=(Myelogenous) OR TI=(Myeloid) OR TI=(Myeloma) OR TI=(Myelomonocytic) OR TI=(Myeloproliferative) OR TI=(Myoma) OR TI=(Nilotinib) OR TI=(non-Hodgkin lymphoma) OR TI=(Obinutuzumab) OR TI=(Pinatuzumab vedotin) OR TI=(Polatuzumab vedotin) OR TI=(Polycythemia Vera) OR TI=(Pomalidomide) OR TI=(Ponatinib) OR TI=(Prolymphocytic) OR TI=(Residual Disease) OR TI=(Rituximab) OR TI=(Romidepsin) OR TI=(Sezary Syndrome) OR TI=(Small Cleaved Cell) OR TI=(stem cell transplant) OR TI=(stem cell transplantation) OR TI=(stem-cell transplantation) OR TI=(Venetoclax) OR TI=(Waldenstrom Macroglobulinemia) OR TI=(waldenstrom*) OR TI=(Lymphangiosarcoma) OR AK=(CMML) OR AK=(Angioimmunoblastic) OR AK=(Lymphoplasmacytic) OR AK=(MYD88 mutation) OR AK=(Abexinostat) OR AK=(Acalabrutinib) OR AK=(Alemtuzumab) OR AK=(AML) OR AK=(Angioimmunoblastic) OR AK=(Azacitidine) OR AK=(Bendamustine) OR AK=(Bing-Neel) OR AK=(Biphenotypic) OR AK=(Blast Crisis) OR AK=(Bone Marrow Transplantation) OR AK=(Bortezomib) OR AK=(Brentuximab vedotin) OR AK=(Burkitt) OR AK=(Carfilzomib) OR AK=(Carmustine) OR AK=(CLL) OR AK=(Clofarabine) OR AK=(CMML) OR AK=(Coltuximab) OR AK=(coltuximab ravtansine) OR AK=(Copanlisib) OR AK=(Daratumumab) OR AK=(Dasatinib) OR AK=(Decitabine) OR AK=(DLBCL) OR AK=(Elotuzumab) OR AK=(Erythroid) OR AK=(Extranodal) OR AK=(Fludarabine) OR AK=(Gemtuzumab ozogamicin) OR AK=(Hematologic) OR AK=(Hematopoietic) OR AK=(Hematopoietic Cell Transplantation) OR AK=(Hematopoietic Stem Cell Transplant) OR AK=(Hodgkin) OR AK=(Ibrutinib) OR AK=(Imatinib) OR AK=(Immunoblastic) OR AK=(Lenalidomide) OR AK=(Leucocythemia) OR AK=(Leukaemia) OR AK=(Leukemic) OR AK=(Lymphoblastic) OR AK=(Lymphocyte) OR AK=(Lymphocytic) OR AK=(lymphoplamsocytoma) OR AK=(Lymphoma) OR AK=(lymphomatoid) OR AK=(Lymphoplasmacytic) OR AK=(Mantle Cell) OR AK=(Megakaryoblastic) OR AK=(Monoblastic) OR AK=(Myeloblastic) OR AK=(Myelodysplastic) OR AK=(Myelofibrosis) OR AK=(Myelogenous) OR AK=(Myeloid) OR AK=(Myeloma) OR AK=(Myelomonocytic) OR AK=(Myeloproliferative) OR AK=(Myoma) OR AK=(Nilotinib) OR AK=(non-Hodgkin lymphoma) OR AK=(Obinutuzumab) OR AK=(Pinatuzumab vedotin) OR AK=(Polatuzumab vedotin) OR AK=(Polycythemia Vera) OR AK=(Pomalidomide) OR AK=(Ponatinib) OR AK=(Prolymphocytic) OR AK=(Residual Disease) OR AK=(Rituximab) OR AK=(Romidepsin) OR AK=(Sezary Syndrome) OR AK=(Small Cleaved Cell) OR AK=(stem cell transplant) OR AK=(stem cell transplantation) OR AK=(stem-cell transplantation) OR AK=(Venetoclax) OR AK=(Waldenstrom Macroglobulinemia) OR AK=(waldenstrom*) OR AK=(Lymphangiosarcoma) OR SO=(Blood cancer J) OR SO=(Bone Marrow Transplant) OR SO=(Clin Lymphoma Myeloma Leuk) OR SO=(Crit Rev Oncol Hematol) OR SO=(Curr Hematol Malig Rep) OR SO=(Hematol Oncol) OR SO=(Hematol Oncol Clin North Am) OR SO=(J Hematol Oncol) OR SO=(J Pediatr Hematol Oncol) OR SO=(Leukemia) OR SO=(Leuk Lymphoma) OR SO=(Leuk Res) OR SO=(Pediatr Blood cancer) OR SO=(Pediatr Hematol Oncol) OR SO=(Stem Cells)

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