



BREVE 12

THE “CANCER INDUSTRY” AND THE PHARMACEUTICAL POLICY IN GERMANY

Based on a presentation at CRITERIA by Dr. Karl Lauterbach, January 2016.

A series on policies and methods based on presentations for experts. Prepared by CRITERIA, a knowledge network on prioritization and health benefit plans from the Inter-American Development Bank.

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THE “CANCER INDUSTRY” AND THE PHARMACEUTICAL POLICY IN GERMANY

INTRODUCTION

This Breve is based on a webinar presented by Dr. Karl Lauterbach who is a medical doctor, professor at the University of Cologne, member of the Deutscher Bundestag and Deputy Leader of the Social Democratic Parliamentary Group. He recently published the book “The Cancer Industry: How a Disease Conquers Germany”.¹

The presentation was delivered on January 27, 2016, to the members of CRITERIA, the Knowledge Network on Health Benefits Packages and Priority Setting in Health.²

“Cancer is the most rapidly increasing disease of our times and we face major challenges in terms of prevention and treatment.”

¹ Lauterbach K. (2015): The Cancer-Industry: How a Disease Conquers Germany (“Die Krebs-Industrie: Wie eine Krankheit Deutschland erobert”)

² Registered members of the Knowledge Network on Health Benefits Packages and Priority Setting in Health can access the audio and PowerPoint files of the presentation at: [http:// www.redcriteria.org/webinars#](http://www.redcriteria.org/webinars#)

Cancer has become a very important topic due to the high number of people affected by it, and the related challenges of its prevention and treatment. The pharmaceutical policy regarding cancer, the cancer industry, and the appearance of new and often costly treatments are becoming issues of growing relevance for many countries.

The following Breve provides an overview of the main challenges that societies, health care systems, and policy makers are currently facing to confront cancer. This brief analyzes the main characteristics of cancer, and shows how these influence the development of new drugs. At the same time, it looks at some of the implications for patients. It also presents some thoughts on the pharmaceutical industry related to cancer treatments. Finally, it summarizes some policy lessons emerging from the analysis, and explains why basic research, better market regulation and a stronger focus on cancer prevention should be the main priorities to fight cancer in the future.

MAIN CHALLENGES

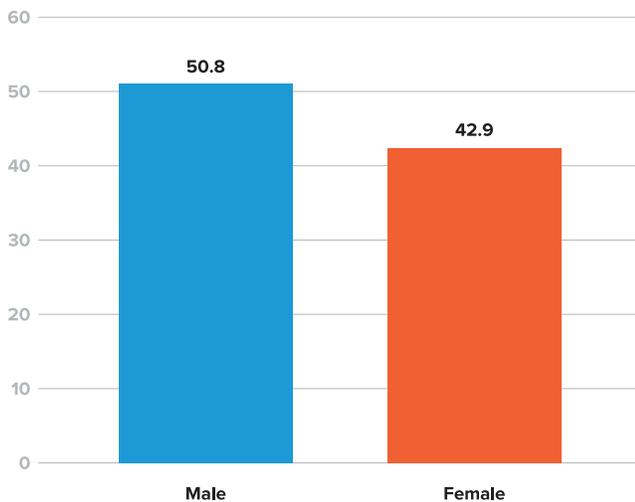
PREVENTION

Cancer is more difficult to prevent than many other diseases. Several risk factors for cancer, like smoking, obesity or alcohol are well known. Yet, more money should be invested in cancer prevention. A stronger focus on prevention would have a very positive impact on fighting cancer in many countries.

TREATMENT

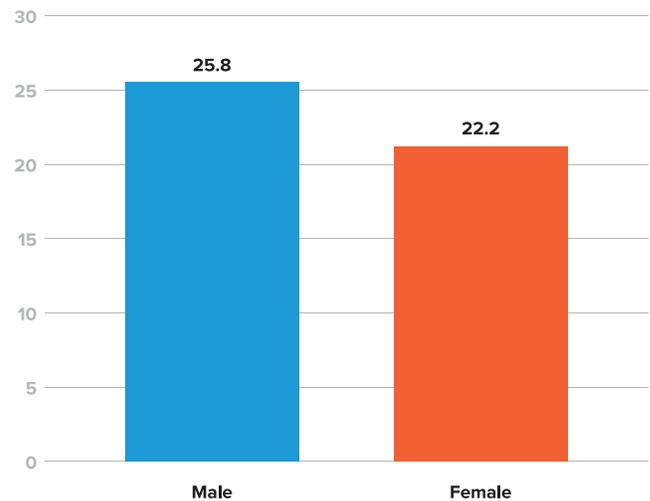
Cancer treatment is still a big challenge, despite extensive research that has been carried out. For other common diseases, such as hypertension, effective and fairly inexpensive drugs are available on the market. Cancer drugs typically work in a limited way, and they often fall short of curing cancer. Usually, they only extend life expectancy by a few months. Especially innovative treatments, such as treatments with newly developed drugs, are very expensive and therefore not always easily accessible for patients.

Figure 1. Probability of developing cancer in Germany (In percent, data from 2009/2010)



Source: Robert Koch Institut (2013): Krebs in Deutschland

Figure 2. Probability of dying from cancer, in percent, data from 2009/2010



Source: Robert Koch Institut (2013): Krebs in Deutschland 1

HIGH INCIDENCE RATE

Cancer is the most rapidly increasing disease of our times, and we face major challenges in terms of prevention and treatment. The likelihood of developing cancer is increasing. In the near future, probably one out of two inhabitants of Germany will get cancer. Figure 1 shows, that the current probability of developing cancer in Germany, at the moment of birth, is 50% for males, and 43% for females.

The probability of dying from cancer in Germany is also very high (Figure 2). Data from 2009/2010 shows that about 25 percent of the population will die from cancer, which is between 200,000 and 250,000 patients per year, with an increase in numbers. This is also because half of the cancer cases are still not curable at the moment.

High incidence rates of cancer are also observed in other European countries and the United States. Germany is not an exception but the rule when it comes to these high incidence rates. Many Latin American countries, China, India, and also in Asian countries face a similar situation. Even in Africa, cancer is becoming more prevalent.

“Cancer seems to be the only major killing disease that we cannot escape by getting older.”

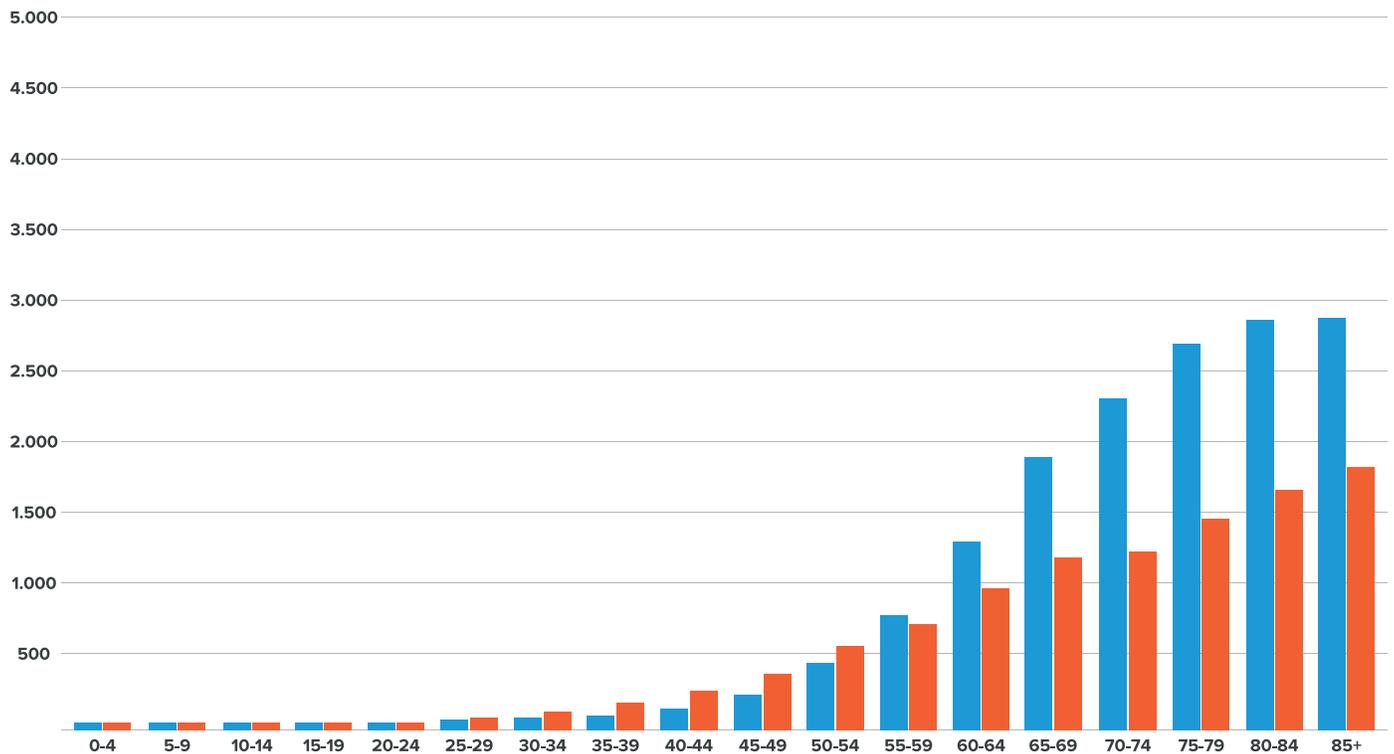
CANCER AND AGEING

In comparison to other diseases, for example diabetes or hypertension, cancer depends much more on the ageing of the population.

As figure 3 shows, cancer incidence is rapidly increasing with advancing age. Cancer occurs in all age groups, yet, most cancer cases are observed in the age group of 50 and higher. There is an exponential increase in the number of cancer cases between the age of 35 and 75.

Analyzing this data is of great interest because it determines how many people will die from cancer if life expectancy continues to increase.

Figure 3. Cancer incidence rates in Germany, by gender and age (per 100,000 population, orange for female, blue for male)



Source: Robert Koch Institute (2013): Krebs in Deutschland

In a study published in 2015 by the British Journal of Cancer, Ahmad, Ormiston-Smith and Sasieni show, that if life expectancy would increase to a 100 years, more than 80% of all males would develop cancer. If life expectancy would increase to 110 years (which is not completely unthinkable), the incidence rate of cancer would increase in such a way, that lifetime risk for males would almost reach 90 percent.³ This is also a major problem for Latin American countries, where the life expectancy has recently increased substantially.

KNOWLEDGE OF CANCER

Despite the fact that cancer has been around for centuries, the way cancer works has only been understood better during the last 25 or 30 years. Even though knowledge is increasing fast, extensive research is still needed to better understand the functioning of cancer and to foster basic cancer research to develop more innovative ways of treatment.

³ A.S. Ahmad, N. Ormiston-Smith, P.D. Sasieni (2015), Trends in the lifetime risk of developing cancer in Great-Britain: comparison of risk for those born from 1930 to 1960

HALLMARKS OF CANCER: HOW DOES CANCER WORK?

The hallmarks of cancer are the changes that occur in cancerous cells and tumors. They are universal, which means, that they are found in all cancers. It is important to understand these characteristics, since they play a vital role in the treatment and the prevention of cancer.

These hallmarks, summarized in figure 4, were first developed by Robert Weinberg and Douglas Hanahan.⁴ The eight⁵ characteristics are described in more detail in this section.⁶

⁴ Hanahan D., Weinberg R., (2000), The hallmarks of cancer;
Hanahan D., Weinberg R., (2011), The hallmarks of cancer: the next generation

⁵ Originally in 2000 Hanahan and Weinberg proposed six underlying principles of cancer. Yet, in an update published in 2011 the authors added two new hallmarks: “deregulated metabolism” and “evading the immune system”.

⁶ New research has been developed in this field, yet the hallmarks described by Hanahan and Weinberg provide a good starting point to analyze the main characteristics of all cancer types.

Figure 4. Hallmarks of cancer

EVASION OF THE IMMUNE SYSTEM	DEREGULATED METABOLISM	LIMITLESS POTENTIAL TO REPLICATE	INSENSITIVITY TO ANTI-GROWTH SIGNALS
SELF-SUFFICIENCY IN GROWTH SIGNALS	SUSTAINED ANGIOGENESIS	TISSUE INVASION AND METASTASIS	EVADING APOPTOSIS

EVADING THE IMMUNE SYSTEM

The immune system typically works against everything that is ‘foreign’ to the body. Cancer cells should be very good candidates to be attacked by the immune system because they are very different from typical body cells. Yet, cancer cells seem to be invisible to the body’s immune system. That is the reason why the immune system is not in a position to understand the circumstances to launch a major attack against cancer cells.

DEREGULATED METABOLISM

Ultimately, most cancer cells live in very abnormal conditions with low oxygen. The new vessels that they build are not perfectly functioning. Nevertheless, they have a deregulated metabolism, which allows them to survive under circumstances that are normally not good conditions for cell survival.

Major advances have been made in the last years in better understanding the complexity of cancer cells, and the related challenges of treatment. Based on this knowledge, new drugs

have been developed. Three main groups of these new drugs, which have shown some promising results, will be described in the next section.

LIMITLESS POTENTIAL TO REPLICATE

The first universal characteristic of cancer cells is that they escape the process of cell mortality. A non-cancer cell divides a number of times and then dies. A cancer cell can escape this process and can grow and divide forever. This is called cell immortality. If the circumstances of division are still there, if the cells have access to nutrition, oxygen and blood supply, then cancer cells of a patient can continue to live and grow even if the person has died.

INSENSITIVITY TO ANTI-GROWTH SIGNALS

Cancer cells are insensitive to anti-growth signals. If a typical cell is not working well, or is dividing too quickly, then signals, called suppressing signals or suppressor genes, come out from this cell. This process helps the cell not

to divide or grow any more. Yet, cancer cells are not sensitive to those signals. The suppressor genes are either not working or not being produced.

SELF-SUFFICIENCY IN GROWTH SIGNALS

Typically cells only grow if there is a growth stimulus from the outside. For example, when someone has a cut, skin cells get a signal from the blood to grow. As a consequence, the skin cells divide and close the wound.

Cancer cells do not depend on this external stimulus because the growth signal comes from inside the cell. Cancer cells are therefore self-sufficient with respect to growth signals.

SUSTAINED ANGIOGENESIS

Cancer cells, and also tumors, need oxygen, nutrition, proteins, and minerals in the blood in order to survive. In order to be self-sufficient cancer tumors develop their own basic blood vessel system. Growing tumors become too big to get enough supply from the blood vessels surrounding it.

These new blood vessels that are formed maintain the tumor, even under conditions, where the oxygen and nutrition supply from other sources would be too low for the cancer to survive.

TISSUE INVASION AND METASTASIS

Tissue invasion and metastasis is a very aggressive characteristic of cancer. Cancer cells break away from the primary tumor, and develop their own new colonies in the surrounding tissues, as well as in distant body parts. These distant settlements are called metastasis. Most cancer types develop metastasis. Metastasis is what nine out of ten cancer patients die from

EVADING APOPTOSIS

Apoptosis means programmed cell death. Cell suicide is a mechanism with which the body makes sure, that those cells that are not working properly or are not needed, do not survive. Cancer cells obviously do not work like they should in the organism from which they come from. In spite of this malfunction, cancer cells are able to bypass this mechanism. For example, a cancer cell that develops from the kidney is not doing the work that the kidney cells typically do. Normally, it would die because of programmed cell death. Yet, for cancer cells this suicide mechanism does not work.

NEW CANCER DRUGS

Important innovative treatments have been emerging based on the research and development of the past years. Especially for cancer types with limited treatment options and high death rates, these new treatments can be promising.

Significant research looks into new drugs to complement traditional ways of treating cancer (such as chemotherapy, radiation, surgery or hormone therapy).

Three main new groups of modern drugs that have been developed, and have shown some promising results are: tyrosine kinase inhibitors, monoclonal antibodies and checkpoint inhibitors. There are more than these three drug types in cancer research, but these are the three most important types.

These new drugs can not cure cancer and they often only increase life expectancy by some months or years, in the best case. Yet, they constitute small but very important changes.

TYROSINE KINASE INHIBITORS

- Suppress growth signals in the cancerous cells
- Can be given orally
- Have been particularly successful for a rare type of leukemia

MONOCLONAL ANTIBODIES

- Work on the cell surface
- Used for suppressing tumor growth
- Injected or by infusion

CHECKPOINT INHIBITORS

- Help the immune system to recognize cancer as a foreign cell system
- Given by infusion
- Have been especially important in the treatment of melanoma

TYROSINE KINASE INHIBITORS⁷

Tyrosine kinase inhibitors are a very important type of drugs, which focuses on the immortal growth of cancer cells discussed above.

Tyrosine kinase inhibitors are proteins in the form of small molecules. They go into the cell and block the proteins that are crucial in giving the growth signal. As a consequence, the cell stops growing and dividing. By blocking the growth chain in the cancer cell, the tumor stops growing.

A major success with this type of drug has been registered for a rare type of leukemia where only one growth signal is not working. A particular tyrosine kinase inhibitor⁸, can block this particular protein and can stop the tumor growth.

This drug is also unusual because it works in the long run, since no resistance builds up against it. Unfortunately, this is a unique success because for other cancers typically several growth channels are not working and several tyrosine kinase inhibitors would be needed to fix the problem. Yet, often there is not enough knowledge available regarding what types of signal chains are not functioning.

⁷ P. Traxler (2003), Tyrosine kinases as targets in cancer therapy - successes and failures JS. Sebolt-Leopold, JM. English (2006), Mechanisms of drug inhibition of signaling molecules

⁸ *Imatinib* is one of the drugs currently on the market.

As a result, tyrosine kinase inhibitors typically only work in a limited way. They cannot cure cancer and very often they only help for a while. Nevertheless, they are very successful drugs especially given that they are specific to the cancer cells and do not massively damage a lot of tissue beyond the cancer cell.

Even if these drugs can not heal cancer, they raise life expectancy and quality of life substantially.

MONOCLONAL ANTIBODIES

Monoclonal antibodies work on the cell surface. Often they work similarly to tyrosine kinase inhibitors. “Chemicals called growth factors attach to receptors on the surface of normal cells and cancer cells, signaling the cells to grow. Certain cancer cells make extra copies of the growth factor receptor. Extra growth factor receptors allow cancer cells to grow faster than the normal cells. Monoclonal antibodies can block these receptors and prevent the growth signal from getting through.”⁹

Antibodies have the special capacity to target and kill tumor cells and at the same time to activate immune effectors to kill tumor cells.¹⁰ Monoclonal antibodies can be used both for suppressing tumor growth by giving a signal

⁹ Mayo Clinic, Monoclonal antibody drugs for cancer: How they work, <http://www.mayoclinic.org/diseases-conditions/cancer/in-depth/monoclonal-antibody/art-20047808>

¹⁰ L.M. Weiner, R. Surana, S. Wang (2010), Monoclonal antibodies: versatile platforms for cancer immunotherapy

to suppressor proteins to do more tumor suppression work, and they also provide growth signals.

In contrast to tyrosine kinase inhibitors, which can be given orally, monoclonal antibodies have to be injected or have to be given by infusion. They are also very important and effective drugs.

CHECKPOINT INHIBITORS

Checkpoint inhibitors are gaining a lot of importance for cancer treatments, and are currently seen as one of the most promising drugs for the future. They have been developed over the past decade. They help the body to recognize cancer cells as a foreign cell system, which then can be attacked by the immune system.¹¹

One of the hallmarks of cancer describes how cancerous cells fool the immune system and make themselves undetectable. They take advantage of checkpoints (immunological breaks) which the body needs to avoid overreaction of the immune system on healthy cells. Therefore, they are not attacked by the immune system. Checkpoint inhibitors achieve that these cancer cells and tumors are visible to the immune system, and permit an immune attack against these cells.¹²

This is a major advance in cancer treatment, in particular for one of the deadliest cancers that we know, which is melanoma, so called black skin cancer. This is a highly deadly disease if it is advanced. Before the checkpoint inhibitors came to the market, it was almost impossible to treat an advanced melanoma. Checkpoint inhibitors made it possible to treat this cancer successfully for a long period of time, even in an advanced stage. Checkpoint inhibitors are very promising drugs for cancer treatment in the future. Clinical trials for these drugs are currently ongoing. At the moment one of the most important research topics is, to find out if checkpoint inhibitors can be developed further, so that they can also be successfully used for the treatment of other cancers, such as, lung cancer, kidney cancer, breast cancer and colon cancer. These are the most important cancer types in terms of how many people get them and how many people die from them.

¹¹ Padmanee Sharma, Klaus Wagner, Jedd D. Wolchok & James P. Allison (2011), Mechanisms of drug inhibition of signaling molecules

¹² Dendreon, Immunotherapy: <http://www.fightcancerwithimmunotherapy.com/>

THE IMPORTANCE OF CANCER DRUGS FOR THE DRUG INDUSTRY

The IMS Health Institute¹³ publishes a yearly oncology trend report. The report from 2014¹⁴ illustrates why cancer is becoming by far the most important research and development topic in the pharmaceutical industry.

Figure 5 shows, that in 2014, more than 6.000 drugs were in the pipeline for all diseases in the different trial phases.¹⁵

Many of those are still in the preclinical phase but 1082 are in phase one, 1,438 in phase two, and still 449 in phase three. In the earliest phases (preclinical phase and phase one), one third of all active products in the pipeline are

¹³ <http://www.imshealth.com>

¹⁴ IMS Health (2015), Developments in Cancer Treatments, Market Dynamics, Patient Access and Value: Global Oncology Trend Report 2015

¹⁵ Phases of drug development (http://www.pfizer.com/research/clinical_trials/phases_of_development): Pre-clinical phase: tested in laboratories and in animal testing.

Phase 1: During this phase an experimental therapy is administered to humans, with or without the disease condition, for the first time. Escalating doses are given to a small number of study participants to measure the effects.

Phase 2: This phase involves a larger number of trial participants with the disease condition, typically several hundred. During this phase researchers assess the effectiveness of treating a specific illness.

Phase 3: In this phase additional information about effectiveness and safety is collected. Trial groups often involve several thousand participants across multiple study locations.

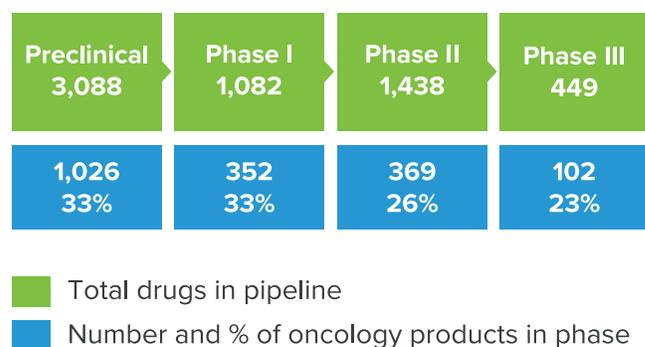
cancer products. Many of these drugs are for tumor types related to low survival rates.

In the past, cardiovascular products were the leading products in that respect. This substantial number of cancer drugs in the pipeline, which is continuously rising, exemplifies the significance of cancer drugs for the industry.

In the future, issues like quality or cost regulation associated with cancer drugs will become even more important. These are complex topics and the developments within the industry are shifting rapidly. Cancer will become even more significant for the drug industry in the future.

Cancer is also an important topic from an economic perspective. The concerns related to profits and costs, cost-effectiveness, as well as to how to maintain the sustainability of healthcare systems, are analyzed in more detail in the following sections.

Figure 5. Number of active pharmaceutical products in the pipeline

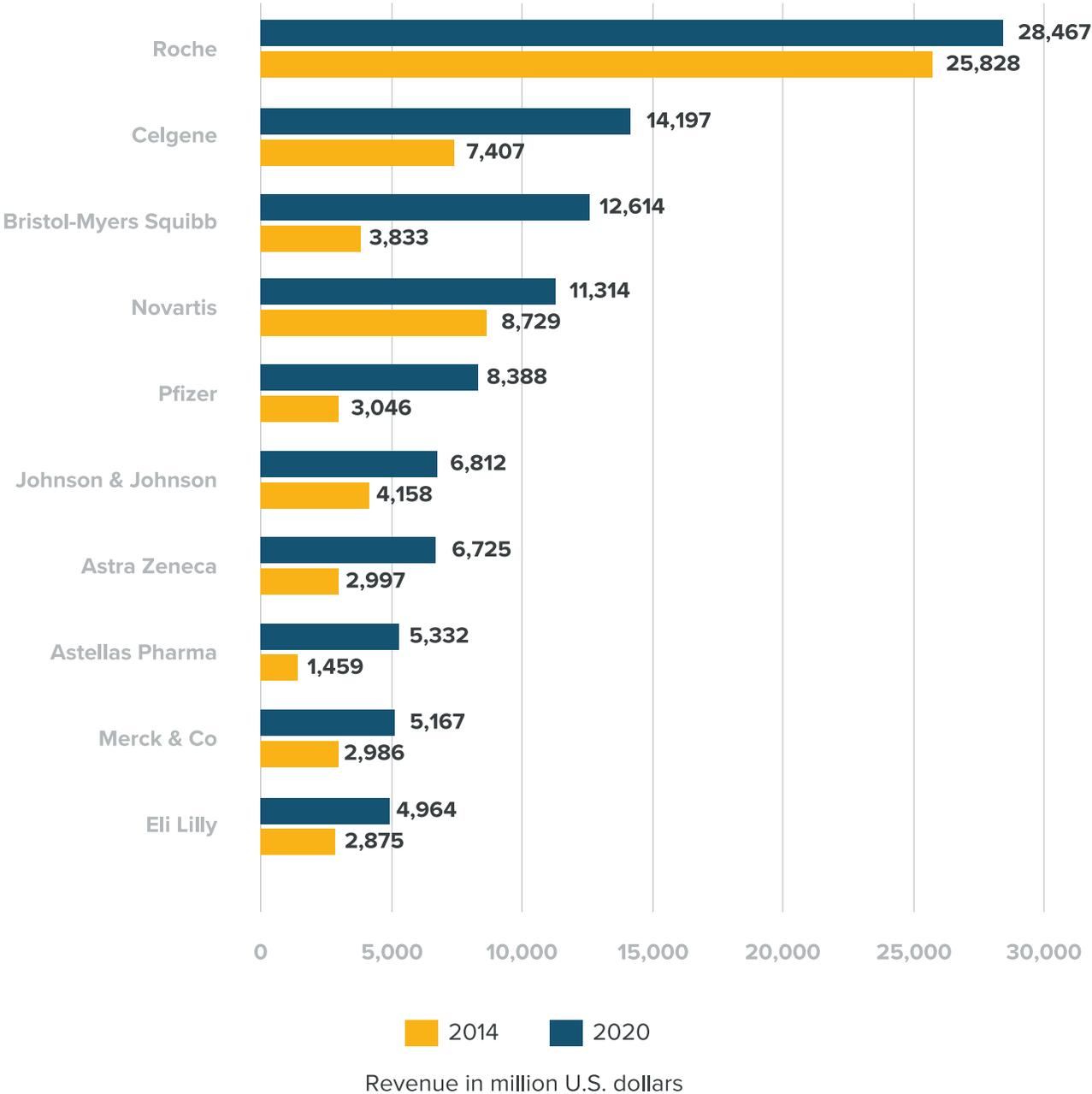


IMS Institute: Global Oncology Trend Report 2014

GROWING REVENUE OF THE PHARMACEUTICAL INDUSTRY

The global market of oncology is steadily growing. Figure 6 shows clearly, that all of the top ranked pharmaceutical companies, based on their total worldwide oncology sales, are expected to increase their revenue considerably in the next years.

Figure 6. Top 10 pharmaceutical companies expected growth based on total worldwide oncology sales (2014 and 2020, in million US\$)



Source: Evaluate Pharma, World Preview 2015, Outlook 2020

“Often times a household is not in a position to pay for the cancer drugs, being close to bankruptcy or being bankrupt.”

Bristol-Myers Squibb expect a growth of almost three times in the time period between 2014 and 2020. Celgene is expected to grow by 100%, and Pfizer is expected to grow by 250%. Most of the growth of these companies is related to new cancer drugs, described in the previous section: tyrosine kinase inhibitors, checkpoint inhibitors and monoclonal antibody treatments. Especially checkpoint inhibitors will constitute the most quickly growing drug expenditure in the next years.

WHAT DOES THIS MEAN TO THE CONSUMER?

One of the main challenges is that drug prices are increasing. Especially in the U.S., where the drug market is less regulated, this has caused serious problems in the past years. From 2000 to 2012 the price for cancer drugs, for one year of therapy, has ten folded from around \$10.000 to \$100.000.¹⁶ At the same time household income has decreased.

This poses a serious dilemma for households affected by cancer. The problem is that cancer drugs are not fully covered by the health insurance system. In some cases, a major co-payment is required or drugs are not available at all through the coverage system. Currently catastrophic health expenditure is already the leading cause for the bankruptcy of individual households in the United States. Americans with cancer pay around 50 to 100 percent more for the same, patented drugs than patients in other countries.¹⁷

For the affected families this situation is a major problem since their struggle is twofold: fighting the disease and at the same time finding ways to pay for the necessary medication.

In many Latin American countries, the situation can become quite similar if there is no regulation, which avoids these tragedies. In Germany, cancer drugs are also marketed above the average price of the European Union.

DRUG COMPANIES: FIVE CRITICAL OBSERVATIONS

It is important to underline that research done by drug companies is important. Significant work is done in their laboratories, and the drugs that are developed are essential for cancer treatment.

¹⁶ Mayo Clinic Proc. 2015, 90(4): 500-504

¹⁷ Mayo Clinic Proc. 2015, 90(4): 500-504

Yet, there is room for some constructive criticism. These charges have been brought forward by leading oncologists in the U.S. and Europe, cancer researchers as well as policy makers.

Drug companies take advantage of the fact that these drugs are desperately needed and that they are very difficult to assess by doctors. In addition, they can be marketed at very high prices because the regulations that are in place are very difficult to control and therefore, very often they do not work very well.

PRICES DO NOT CORRELATE WITH BENEFITS

Many of the new cancer drugs that have been developed are very highly priced, despite the fact that they can only increase the patient's life expectancy by some months. Other, cheaper drugs have longer life expectancy increases and similar results in improving quality of life. New cancer drugs can be marketed at very high prices due to a lack a strong regulatory framework in many markets. Research has clearly shown that the cost-benefit relation for many of these drugs is not justified.

MISLEADING JUSTIFICATION OF HIGH COSTS

The drug industry often justifies the high prices to the governments, or to consumers, by arguing that the money is needed to keep up the research related to these drugs. They also argue that the drug related profit is essential to pay for

the costs of the research that has led to the drug development in the first place.

Research by economists at many universities, including Stanford University in the U.S., has shown that the costs of the research done by pharmaceutical companies is typically much lower for the industry than they claim.¹⁸ Most of the leading research development for new drugs is tax paid. This is the case because it is mainly university research which leads to the original research results that make the drug development possible. For example, all of the major research on tyrosine kinase inhibitors, and the most important checkpoint inhibitors, was done by American universities, and it was paid for by American National Cancer Institute research money. In the U.S. 85% of the basic research on cancer is funded by tax payers money.¹⁹

“Drug companies are risking a breakage in the healthcare systems because price increases are so substantial that, in the long run, it is unclear if we can afford to keep up the solidarity principle.”

The U.S. has been particularly successful in providing ground breaking research. Germany still has potential to improve in the field of basic research for innovative drugs at universities.

¹⁸ i.e.: D. Light and R. Warburton (2011), Demythologizing the high costs of pharmaceutical research

¹⁹ Mayo Clinic Proc. 2015, 90(4): 500-504

MISUSE OF MARKET POWER

There is only a small number of companies on the market, given that the development of cancer drugs is expensive and time consuming. Companies also need to have a very strong network. Therefore, competition is not very high. In order to achieve market entry, drug companies must invest in expensive studies.

Companies only make major profits if they are the first ones to achieve admission to the market. Bringing a new cancer drug to the market is like a race. Companies need good relations with university hospitals and institutions like the FDA²⁰ or the European Medicine Agency (EMA).²¹ Drug companies also have privileged access to the compounds, the patents, the patients and the researchers needed to complete the studies, which are required to get to the market quickly.

Since speed is everything, big companies, which have the infrastructure to achieve quick market access, use their market power to increase their profits.

OBSTRUCTION OF RESEARCH

The fact that companies are mostly concerned about getting their drugs to the market as quickly as possible, takes away attention and research capacity from basic research. Basic research is the type of research that provides

groundbreaking new pathways for new medication to treat cancer. Companies therefore focus on researching drugs that are already on the market and thereby they obstruct new basic research. In the U.S. for example, the public and private funding for basic research in cancer is flat or even going down slightly, while there is an ever higher expenditure for cancer drugs and rising profits.

HIGH PRICES BURST THE HEALTHCARE SYSTEM

Prices for cancer drugs, especially newly developed drugs are rising significantly. In Germany, for example, Dr. Lauterbach estimates that from now to 2030, within only 15 years, expenditure on cancer drugs will increase from about 6 billion Euros per year to possibly 40 billion Euros per year. At this point, it is unclear how the current solidarity system can cope with such an explosion in prices. The paradox is that while there is a major increase in drug expenditure, not only in Germany but also in the U.S., and many other countries, cancer survival rates have not increased substantially. Most patients with advanced cancers still die. Drugs can enhance the quality of life during the treatment. Yet, the major increases in costs and research are not reflected in the survival rates.

²⁰ United States Food and Drug Administration

²¹ EMA is the leading European institution to proof drugs for the European market.

OPPORTUNITIES AND BENEFITS OF CANCER PREVENTION

Cancer prevention is an important topic since many of the risk factors are well known and more investment in prevention would have a big impact. The return on investment would be much higher if the money spent on new cancer drugs, which are often very expensive and not very cost effective, would be spent on cancer prevention. Figure 7 gives an overview of the four main risk factors described by Dr. Lauterbach.

Figure 7. Main risk factors for cancer



SMOKING

The most important risk factor for cancer is smoking. Smoking does not only cause lung cancer but many other forms of cancer. In Germany, for example, at least 25 percent of all cancer cases are due to smoking. Research has shown that this number is also very high in Latin America.

Smoking affects all of the mechanisms related to the hallmarks of cancer. Smoking cessation and prevention should be the primary measure to avoid cancer deaths and an explosion of our health care costs. It will be very expensive to treat the high number of smoking related cancers, especially with the newly developed medicines, which are very pricy. This money would be spent more efficiently on prevention.

“Smoking cessation and prevention should be our primary target if we want to avoid cancer deaths, and an explosion of our health care costs.”

OBESITY

Obesity is a major risk factor for diabetes, heart diseases, and also for cancer. Fighting and preventing obesity is therefore of utmost importance since it combats three of the deadliest diseases of our times.

LACK OF EXERCISE

People who sit most of the day have a higher risk of developing cancer. For example, research has shown that a regular exercise like running or biking reduces the risk for breast cancer.

ALCOHOL

In the past, alcohol has been underestimated as a risk factor for cancer. Research has shown

that breast and colon cancer, for example, are strongly related to alcohol. Interestingly, the risk of developing cancer caused by alcohol is much higher for smokers than for non-smokers.

CONCLUSIONS AND POLICY LESSONS

The high incidence rate of cancer, not only in Germany but all around the globe, has become a major challenge for health policy makers, patients, doctors, researchers and other stakeholder groups.

Many of the difficulties that are related to cancer have not been tackled yet. Most cancers are not curable at the moment. Despite extensive research, there are still many elements that have to be understood more deeply. The difficulties of finding cures to many types of cancer, are partly related to the complex and peculiar nature of cancer cells.

Research has led to the development of new, innovative drugs which have had an important impact for some cancer types, yet they have to be further investigated to address several solid cancers which are currently very difficult to treat, especially if discovered in an advanced stage.

As far as the pharmaceutical industry is concerned, it is important to keep in mind that the profits from cancer drugs are steadily increasing. There is little competition in the market and

control mechanisms are sometimes vague. The prices for drugs, especially for the newly developed ones, are very high even though their benefits are often limited. For many cancers life expectancy can only be increased by some months. Health care systems around the globe, face difficulties to deal with these high prices. Pharmaceutical companies argue that these are justified by the related research costs. Yet, this is not very accurate since a substantial part of basic research is carried out by universities and financed by tax payer's money.

POLICY LESSONS

FOCUS ON PREVENTION

One of the main emerging policy lessons is to place a stronger focus on cancer prevention. Some of the money invested in research for new drugs could be more effectively used for prevention, since the cost benefit relation of many drugs is not very good. In addition, several risk factors are known very well.

EXPANSION OF BASIC RESEARCH

Another aspect to be taken into account by policy makers is the importance of basic, groundbreaking research done by universities. Some countries, especially the U.S., have been very successful in this area. Other countries, like Germany, could further expand university based basic research. This type of research can open completely new ways of treatment for different cancer types and is therefore crucial.

FOSTER MARKET REGULATION

The regulation of drug markets is another important policy concern. It will be crucial to find ways to regulate markets in order to protect consumers. Many countries run the risk of having increasing rates of patients who are not able to cope with catastrophic health expenditure related to cancer. This is also particularly true for Latin America, where life expectancy has increased notably, and the number of cancer cases will be continuously rising. At the same time it will be of increasing relevance for health care systems around the globe, to find ways of dealing with the growing cancer drug expenditure, which can put the solidarity principle at risk.

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