

# Comparator Report on Cancer in Europe 2019 – Disease Burden, Costs and Access to Medicines

## Master slide deck

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THE SWEDISH INSTITUTE FOR HEALTH ECONOMICS

# Overview

	Content	Chapter in report
The challenge	Disease burden of cancer in relation to other diseases	1 + 2.3.1 + 2.3.2
Stemming the tide	Cancer incidence	2.2.1 + Appendix
	Prevention and screening	2.3.3 + 3.3 + 3.4
Bringing benefits to patients	Cancer mortality and survival	2.2.2 + 2.2.3 + Appendix
	Research and innovation in diagnostics and treatment	2.3.3 + 3.5 + 3.6 + 3.7 + 4.4
	Patient access to cancer medicines	4.5 + 4.6 + 4.7
Economic burden of cancer	Direct and indirect costs	2.4 + 4.5
Policy measures for improved cancer care	Efficiency of cancer care spending and patient outcomes	5.4
	Innovation and creation of value to patients	5.3 + 5.5

# The challenge

What is the burden of cancer?



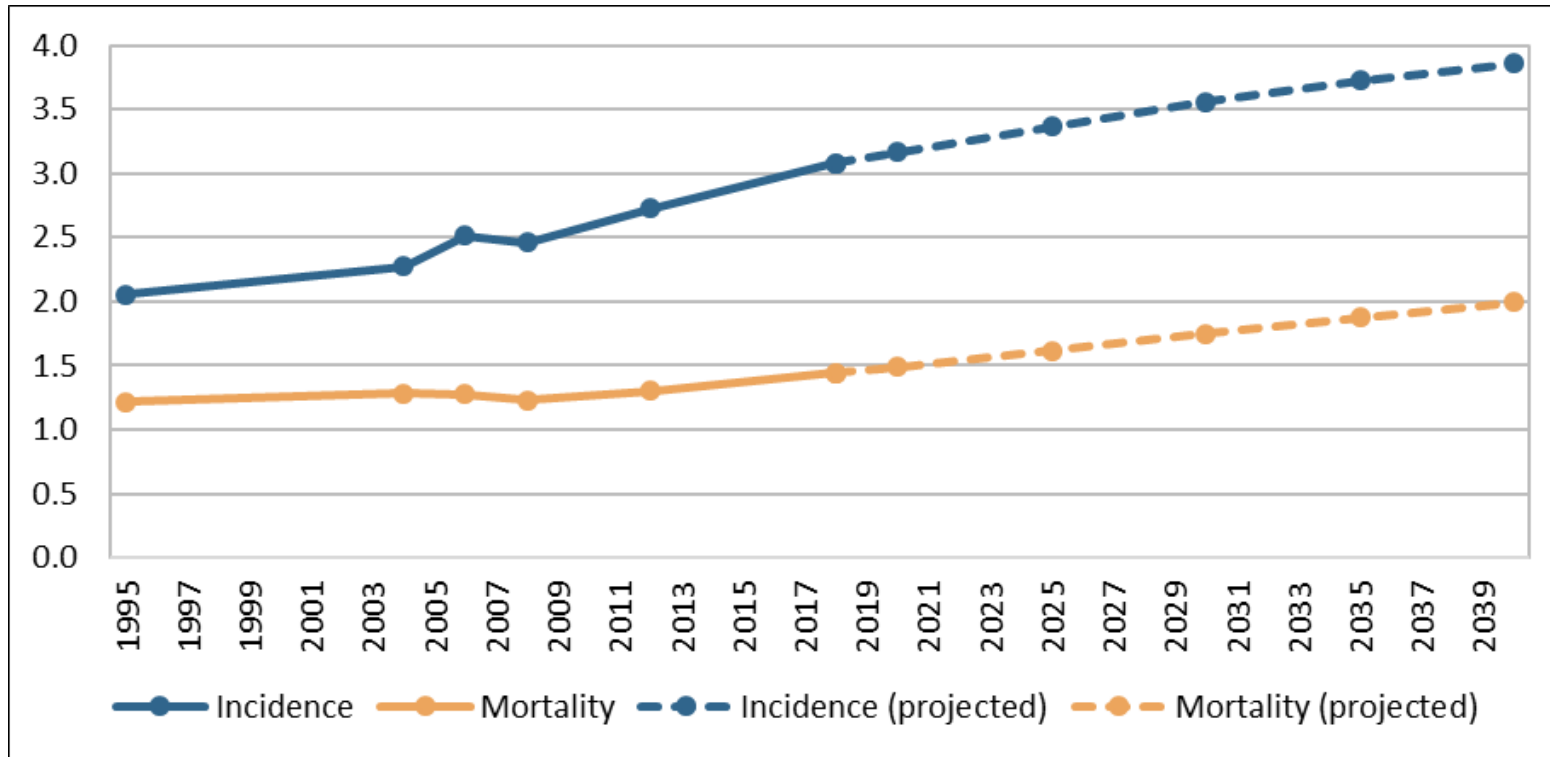
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IN EUROPE 2019  
-DISEASE BURDEN, COSTS AND ACCESS  
TO MEDICINES



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# Trends in incidence and mortality



**50% increase in incidence**  
(from 2.1 to 3.1 million cases) 1995–2018

**20% increase in mortality**  
(from 1.2 to 1.4 million cases) 1995–2018

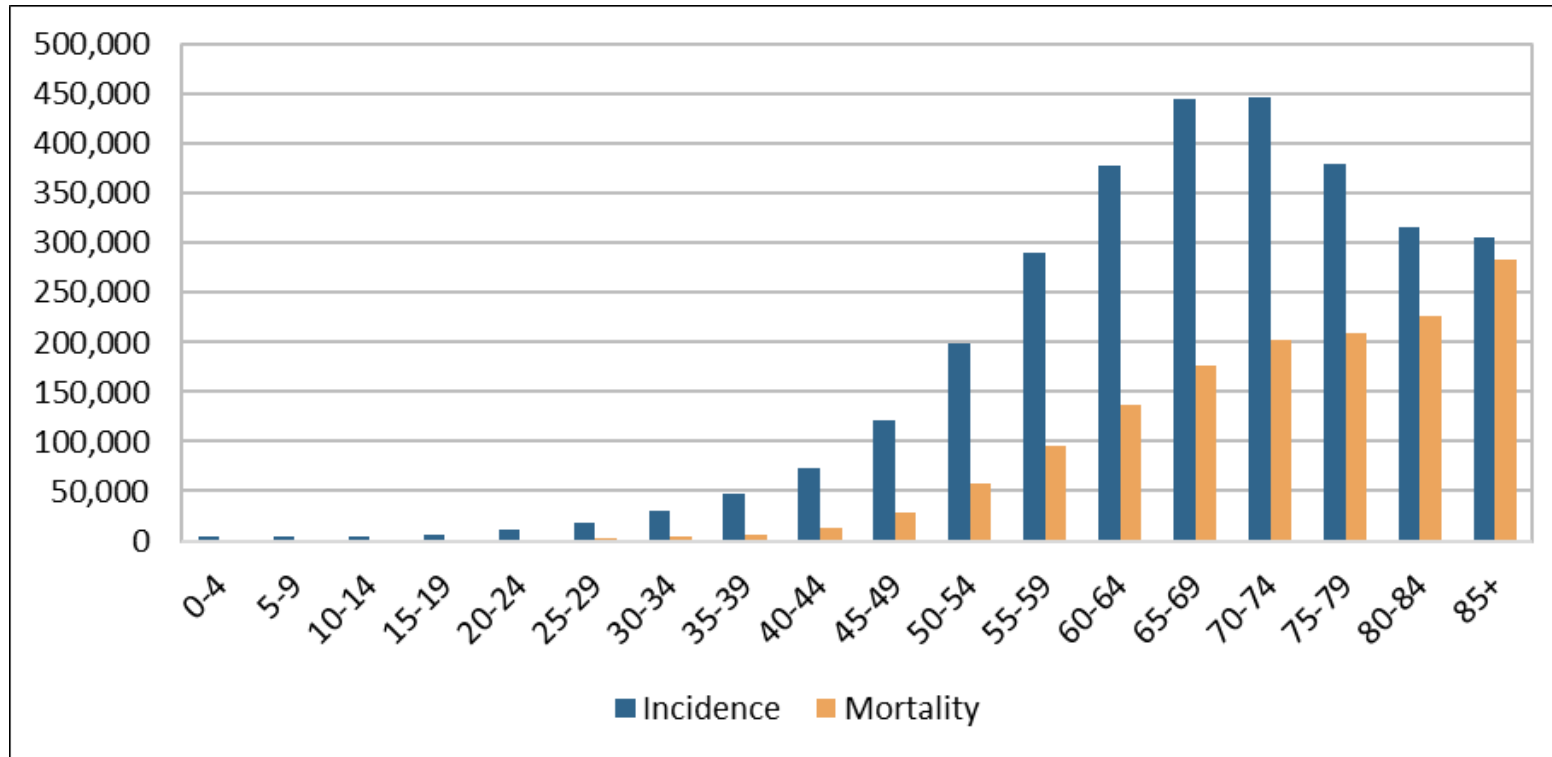
**Population aging** is a major determinant of trends in incidence and mortality

Cancer incidence and mortality (in million cases) in Europe, 1995–2018 and projection of status quo 2020–2040

Notes: Europe includes the EU-28, IS, NO, and CH. Cancer is defined as ICD-10 C00-C97/C44.

Source: Boyle et al (2005), Bray et al (2002), Ferlay et al (2007+2010+2013+2018)

# Cancer is an aging-associated disease



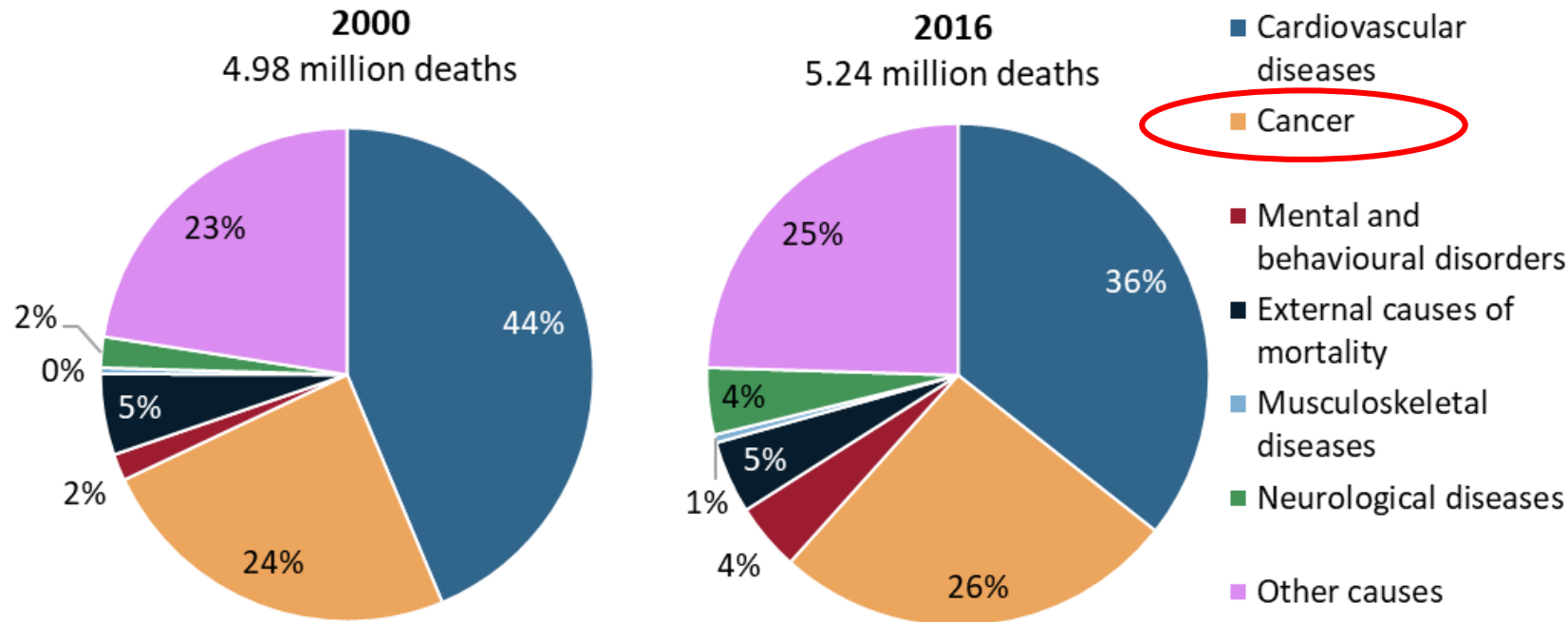
3 out of 5 incidence cases and 3 out of 4 mortality cases occurred in people aged 65+ in 2018

Twofold strategy is needed:  
1) Reducing incidence → prevention, screening  
2) Reducing mortality → screening, diagnosis, treatment

Number of cases of cancer incidence and mortality by age group in Europe, 2018

Source: Ferlay et al (2018)

# Disease burden of cancer - deaths



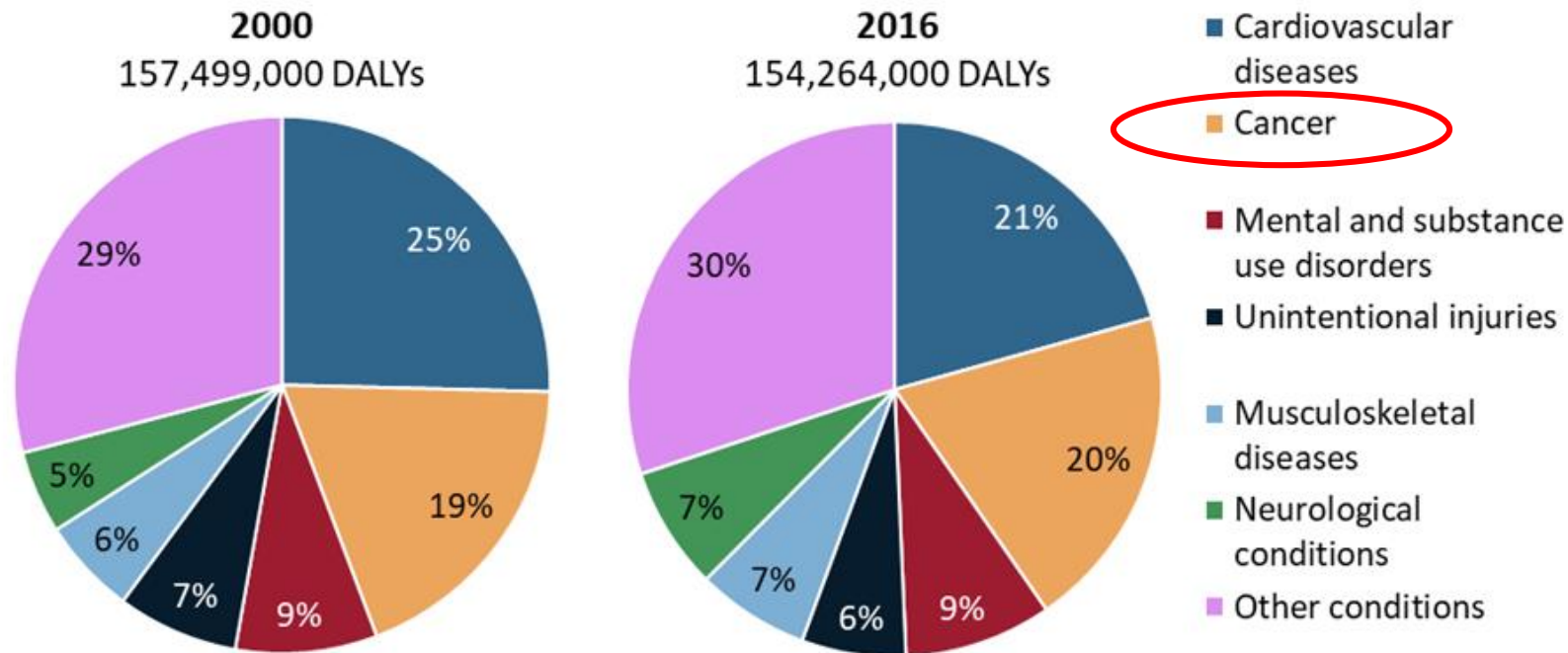
Cancer is the 2<sup>nd</sup> leading cause of death behind cardiovascular diseases

Cancer has already become the leading cause of death in DK, FR, NL, UK in 2016

Number of deaths by cause in Europe, 2000 & 2016

Source: Eurostat, WHO

# Disease burden of cancer - DALYs



Disease burden of the largest disease groups in Europe, 2000 & 2016

Source: WHO

Cancer is the 2<sup>nd</sup> leading cause of DALYs behind cardiovascular diseases

Cancer has already become the leading cause of DALYs in many wealthier countries (BE, DK, FR, IS, IE, IT, LU, NL, NO, PT, SI, ES, CH, UK)

DALYs (Disability Adjusted Life Years) comprise the effect of premature mortality and morbidity of a disease

# Stemming the tide

Cancer incidence

What's the current situation and how can it be improved?



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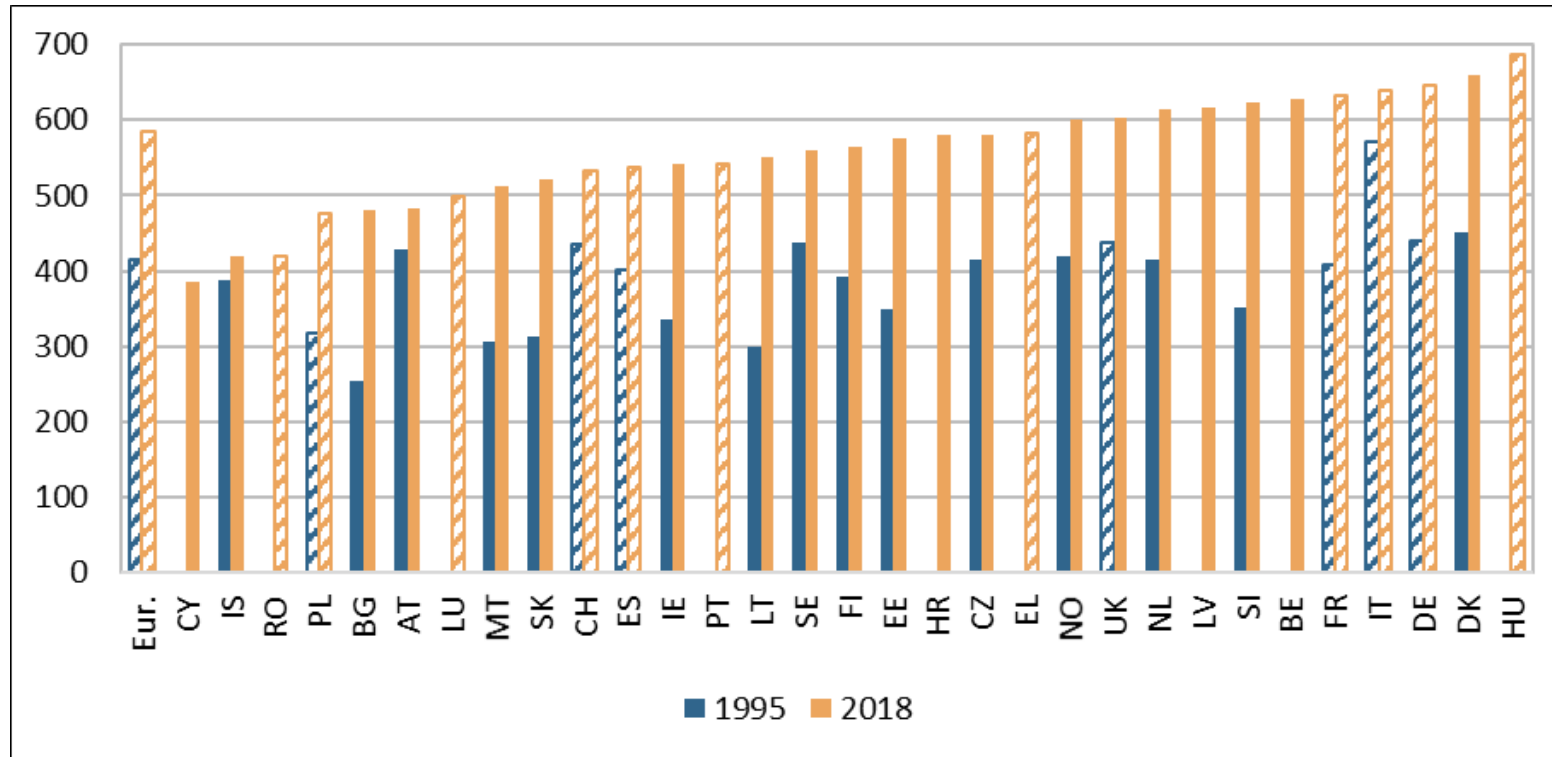


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# Cancer incidence has been increasing in all countries



Factors driving the development over time:

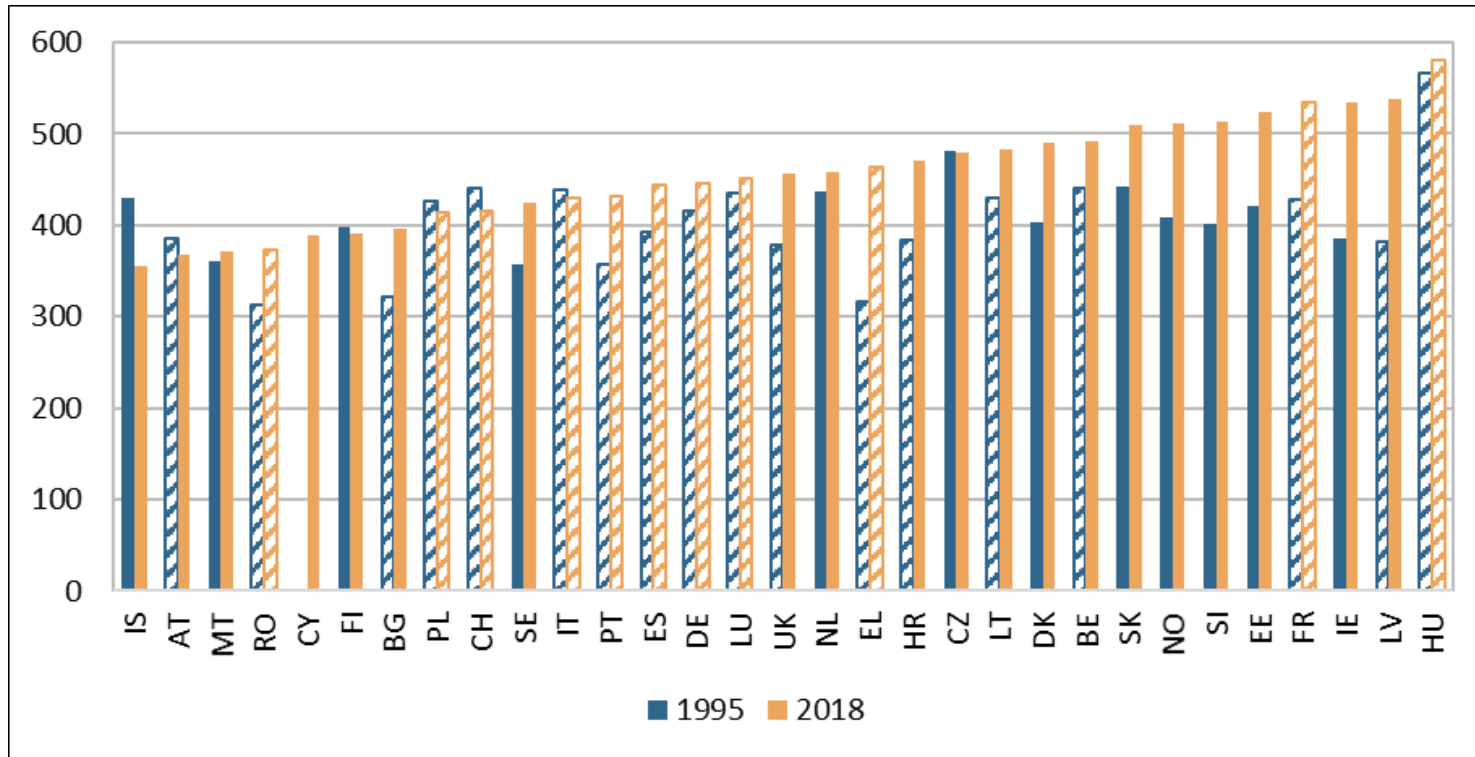
- Population aging
- Risk factors (smoking, obesity, sunbathing, etc.)
- Screening
- Epidemiological development in other diseases (competing risks of death)

Estimated number of cancer incidence cases per 100,000 inhabitants (crude rates for both sexes), 1995–2018

Notes: Hatched bars indicate that national estimates are based on regional data or neighboring countries.

Source: ECIS, NORDCAN, Jönsson et al (2016)

# Standardized incidence rates in men



Age-standardized rates remove the influence from population aging over time and different age structures of countries

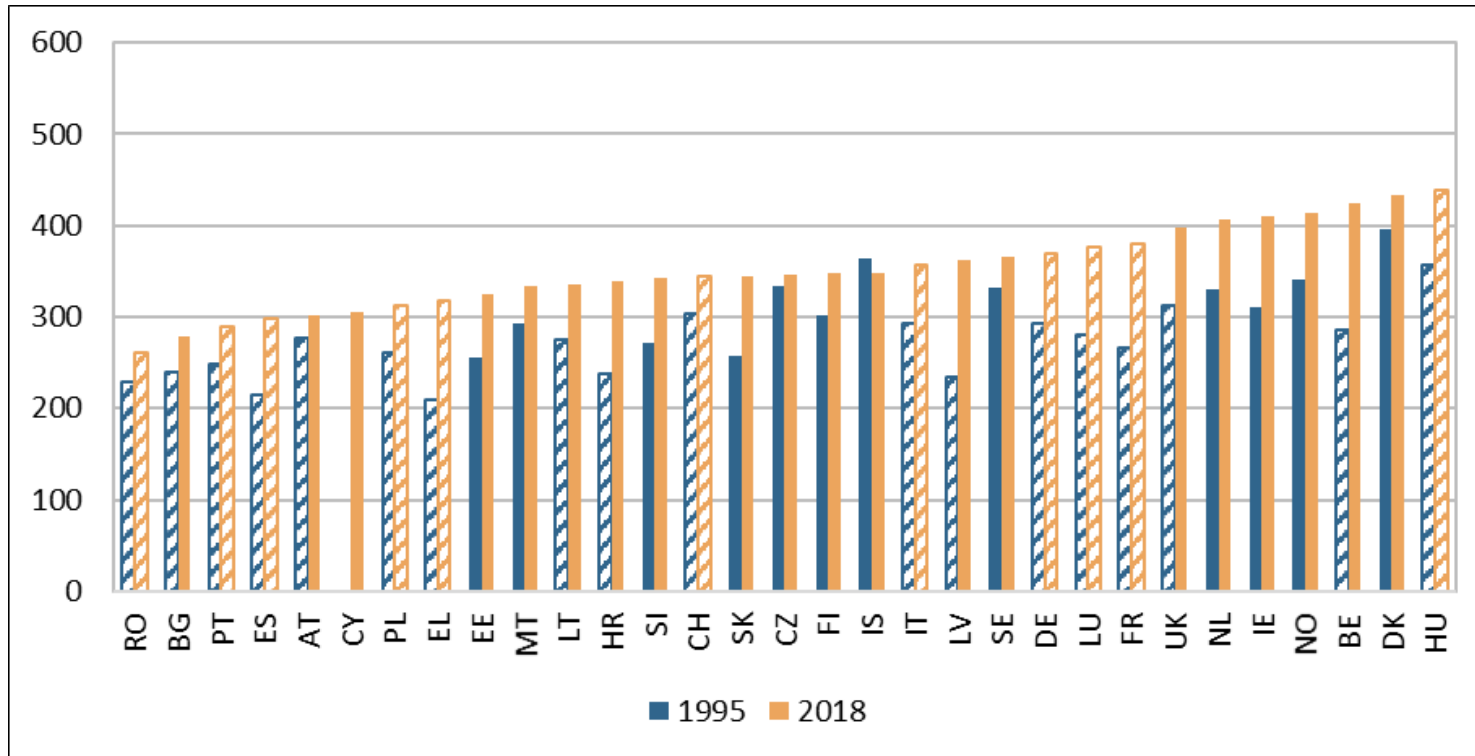
Some countries recorded slight decreases

Cancer incidence in men per 100,000 inhabitants (age-standardized rates (Old European standard)), 1995–2018

Notes: Hatched bars indicate that national estimates are based on regional data or neighboring countries.

Source: Bray et al (2002), Ferlay et al (2018)

# Standardized incidence rates in women



Incidence increased in all countries (except in Iceland)

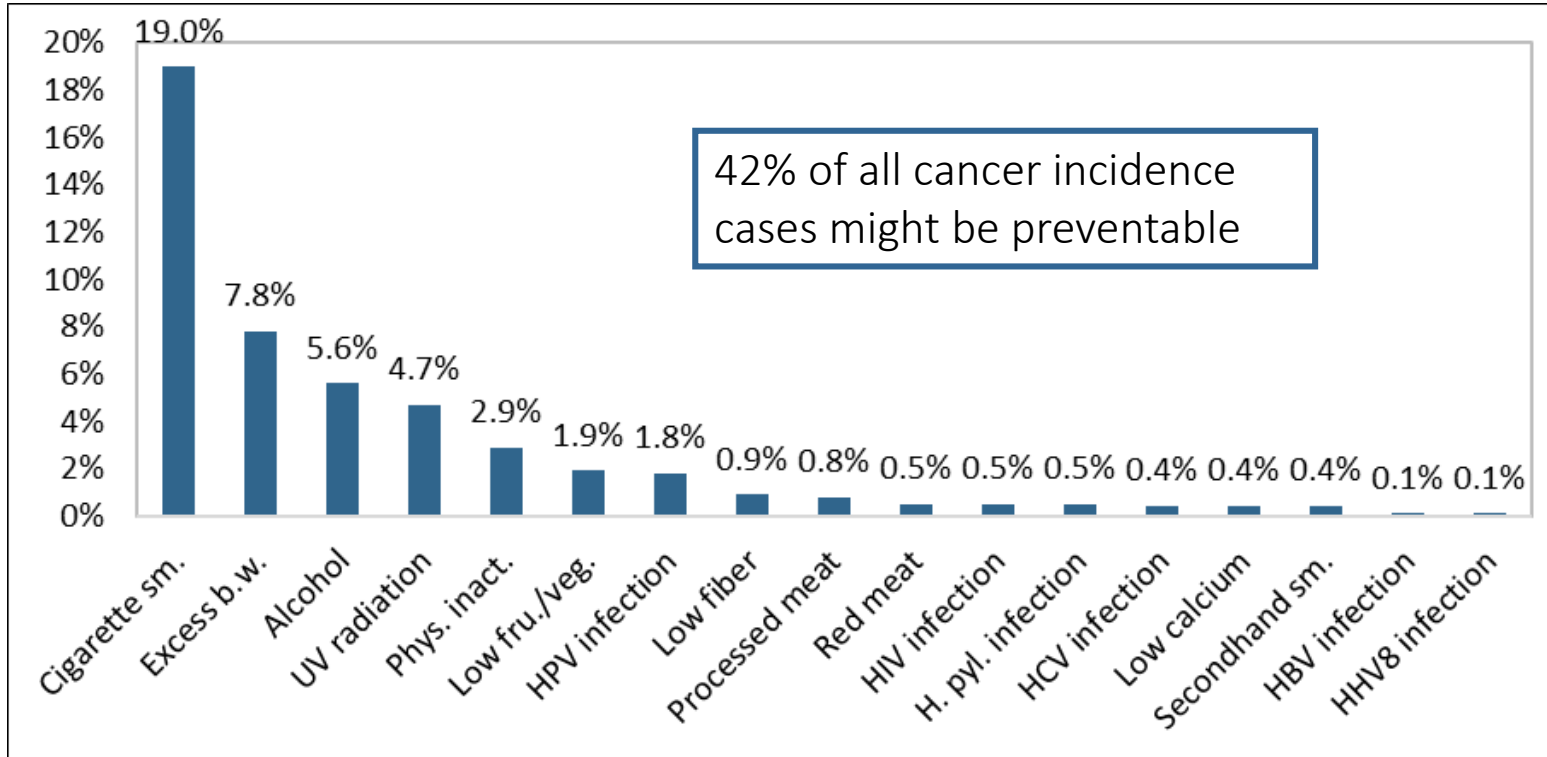
Cancer incidence is lower in women than in men (except in Iceland)

Cancer incidence in women per 100,000 inhabitants (age-standardized rates (Old European standard)), 1995–2018

Notes: Hatched bars indicate that national estimates are based on regional data or neighboring countries.

Source: Bray et al (2002), Ferlay et al (2018)

# Prevention



Estimated share of cancer incidence cases attributable to risk factors in the US (both sexes aged  $\geq 30$  years), 2014

Notes: sm. = smoking; b.w. = body weight; UV = ultraviolet radiation; Phys. inact. = physical inactivity; fru./veg. = fruit and vegetable consumption; HPV = human papillomavirus; HIV = human immunodeficiency viruses; H. pyl. = Helicobacter pylori; HCV = hepatitis C virus; HBV = hepatitis B virus; HHV8 = human herpes virus type 8. Source: Islami et al (2018)

Most of the preventable risk is related to a few lifestyle factors (smoking, eating and drinking habits, etc.)

Potential measures:

- Public campaigns and education to raise awareness
- Excise taxes
- Smoking bans
- Vaccination programs
- More research to increase biological understanding of the carcinogenic process to help identify new targets for prevention

# Screening

- EU Council recommendation in 2003
  - Breast cancer screening
  - Cervical cancer screening
  - Colorectal cancer screening
- Other programs
  - Lung cancer screening
  - Prostate cancer screening → risk of many false positive cases (latent disease)
- Future directions
  - Blood tests on circulating DNA

## Aims:

- Detection and treatment of precursor lesions → prevention
- Detection of actual disease at early stages → facilitate treatment

## Key requirements for broad use of a screening method

- Accurate diagnosis (high sensitivity and specificity)
- Acceptable diagnostic approach

## Successful implementation of population-based screening programs requires:

- Appropriate definition of risk groups
- Measures to achieve high participation rates

# Bringing benefits to patients

Part 1: Cancer mortality and survival



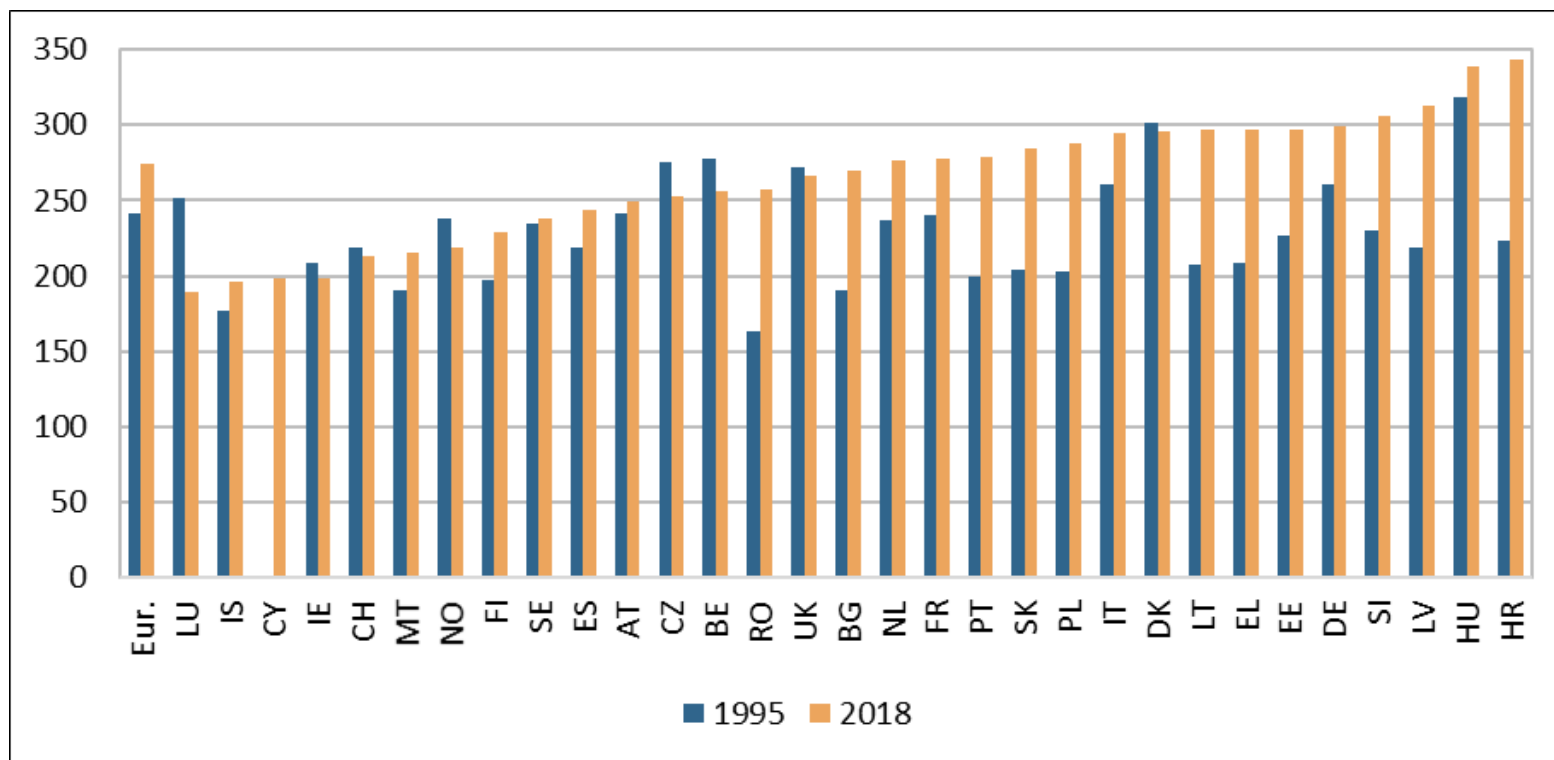
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# Cancer mortality has been increasing in most countries



Some (slight) decreases in BE, CZ, DK, IE, LU, NO, CH, UK

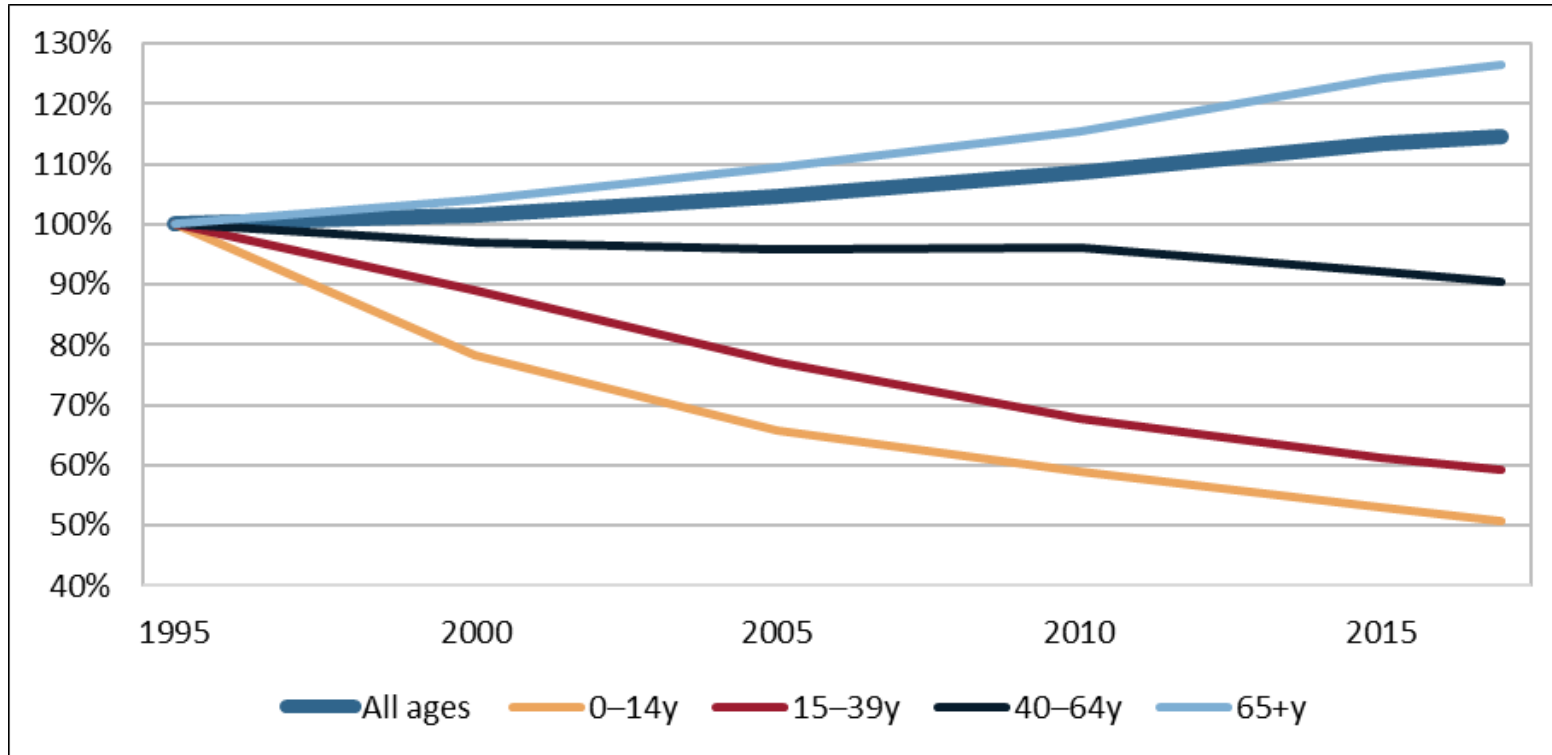
Factors driving the development over time:

- Incidence (and all its determinants listed above, incl. population aging)
- Screening (early stage detection)
- Treatment

Estimated number of cancer mortality cases per 100,000 inhabitants (crude rates for both sexes), 1995–2018

Source: IARC and ECIS

# Cancer mortality by age group



Deaths from cancer are still increasing overall

In age groups below 65 years, deaths are (strongly) decreasing

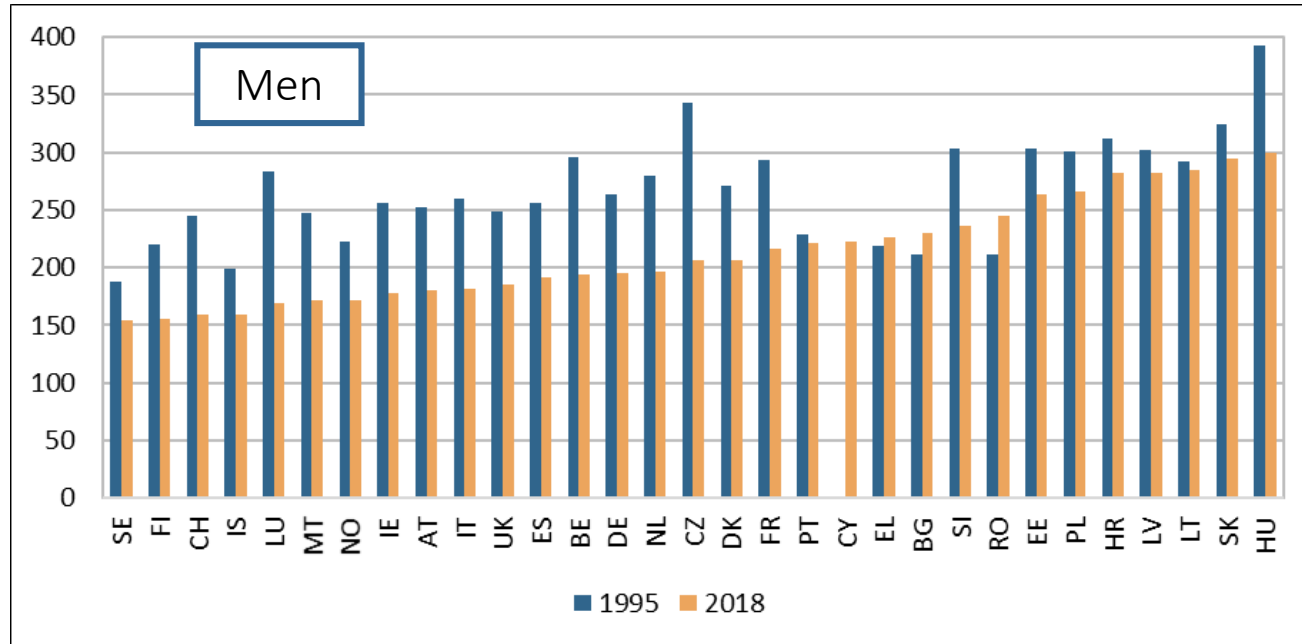
Cancer mortality by age group (1995=base year) in Europe, 1995–2017

Notes: Figures are based on total number of deaths (not per 100,000 inhabitants)

Source: IARC and Eurostat



# Standardized mortality rates



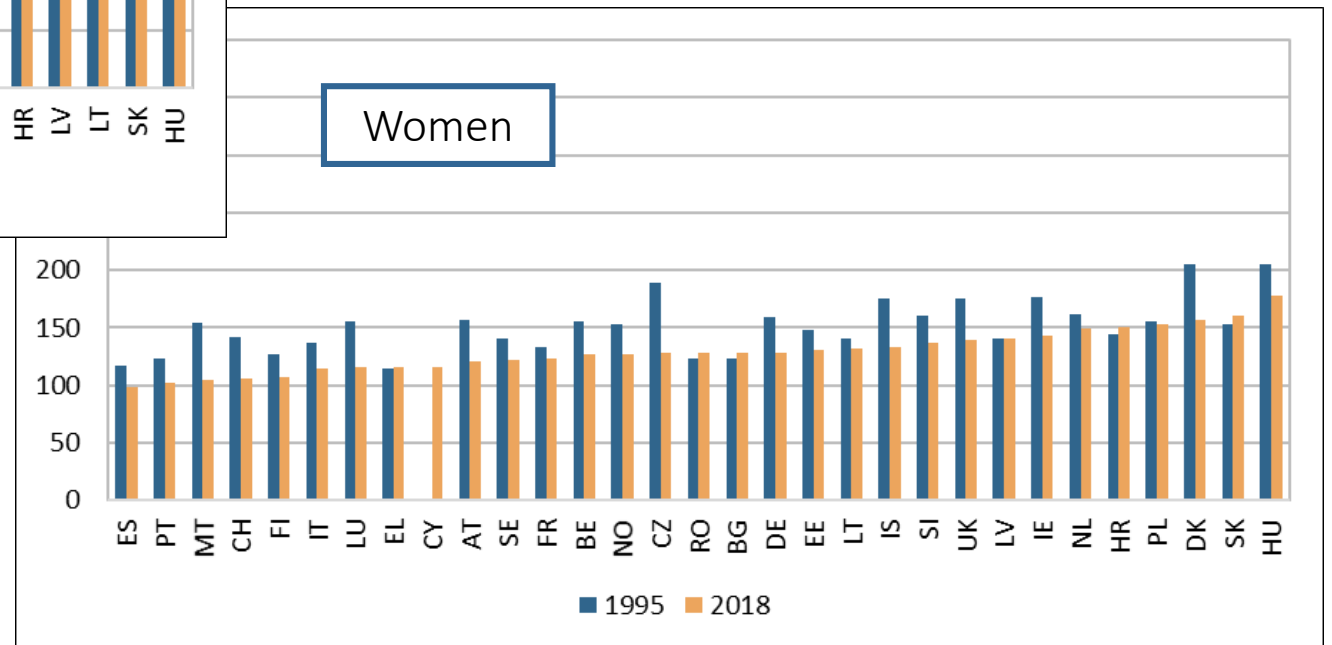
Smaller (absolute and relative) decreases in women than in men

Decreases in men in all countries except in BG, EL, RO

Decreases in women in all countries except in BG, HR, EL, RO, SK

Cancer mortality per 100,000 inhabitants (age-standardized rates (Old European standard)), 1995–2018

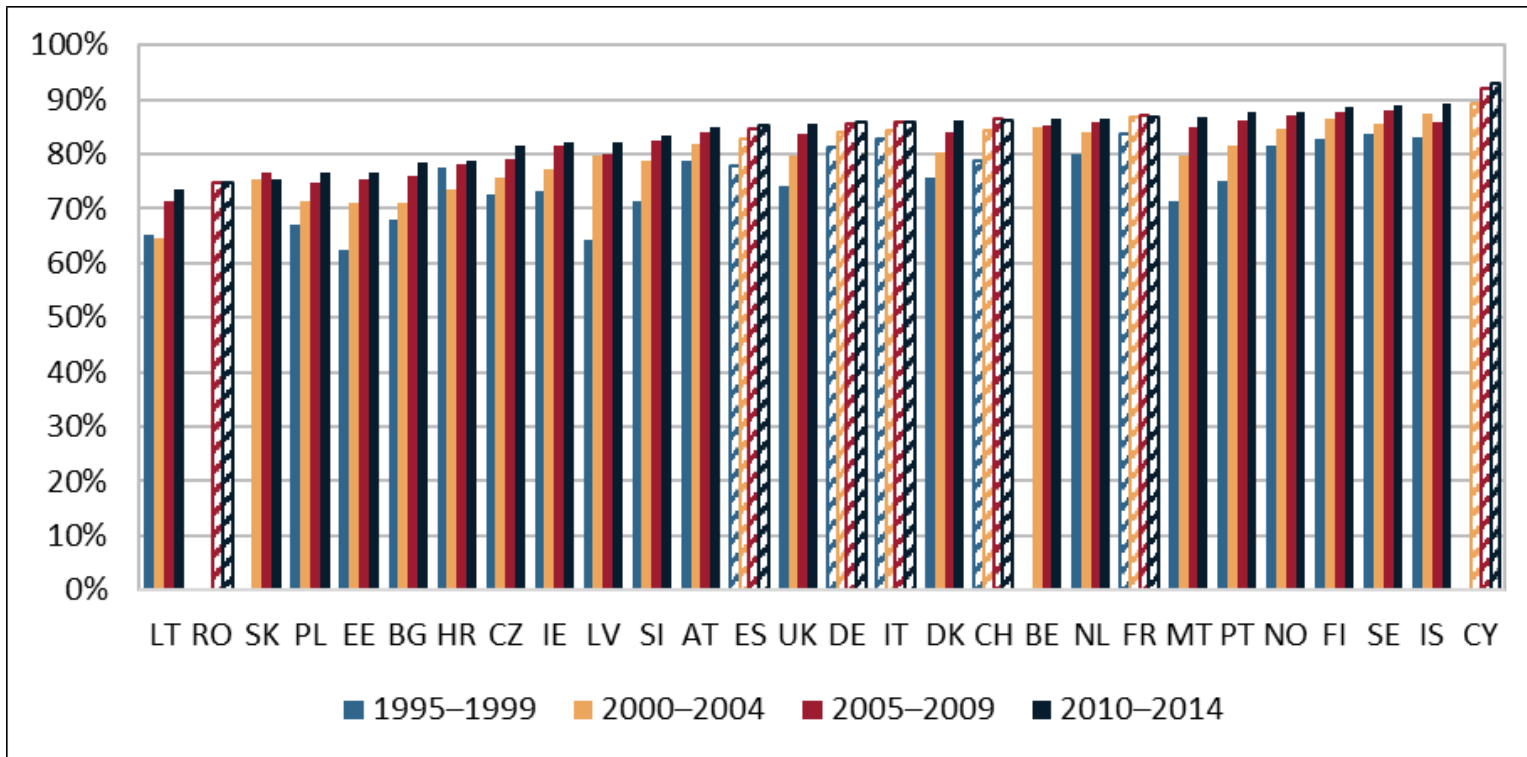
Source: Bray et al (2002), Ferlay et al (2018)



# Survival

- Patient-relevant measure of the burden of cancer
- General results:
  - Improvements in 5-year survival between 1995–1999 and 2010–2014 in all countries and cancer types
    - Explains the smaller overall increase in mortality ( $\approx 20\%$ ) than in incidence ( $\approx 50\%$ ) in Europe between 1995 and 2018
  - Wealthier countries typically have the highest survival rates
    - Highest: Belgium, Germany, Nordic countries (except Denmark), Switzerland
    - Lowest: Bulgaria, Croatia, Poland, Romania, Slovakia

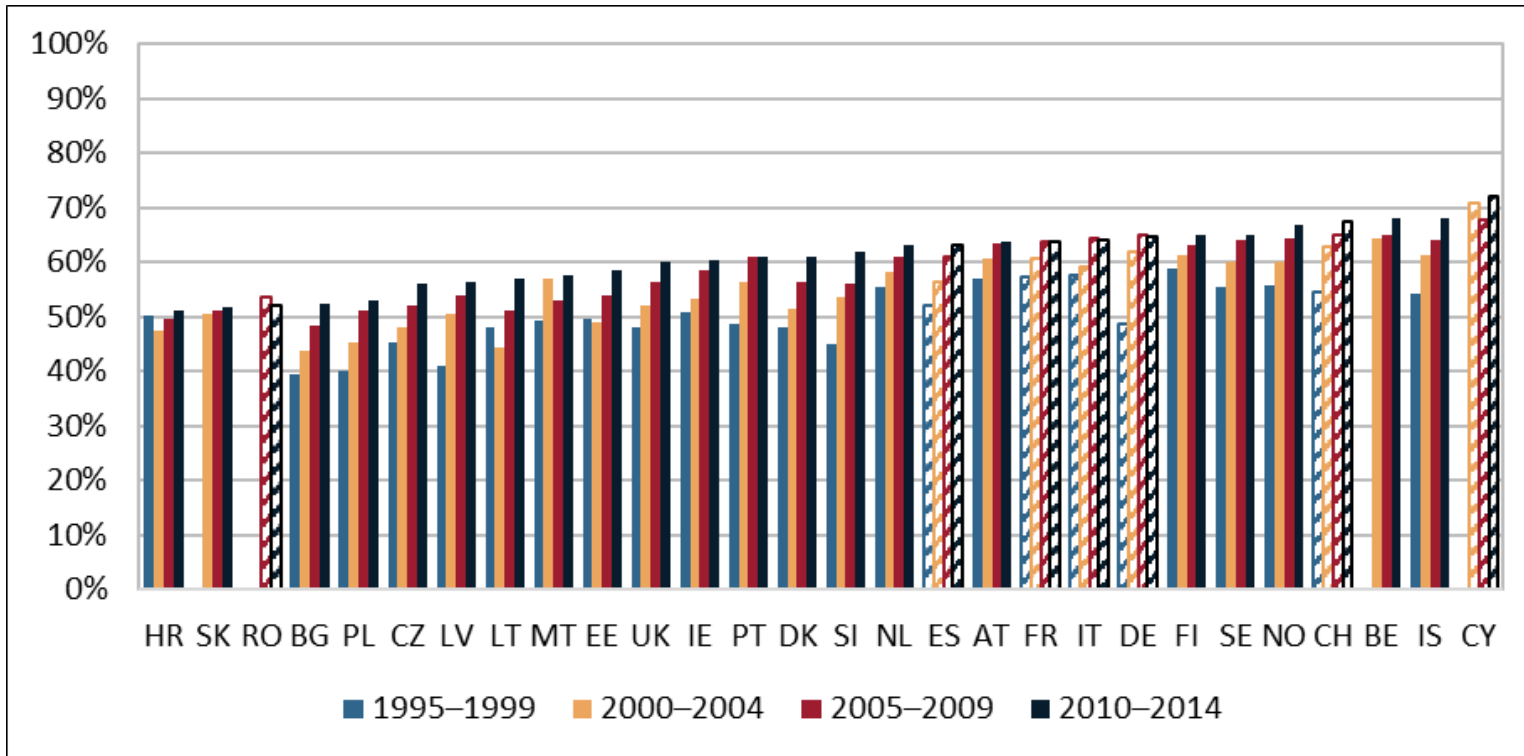
# 5yr survival – breast cancer



5-year age-standardized net survival rates for breast cancer in female adult patients (15–99 years), 1995–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data. Hatched bars in CY indicate less reliable estimates. Source: Allemani et al (2015+2018)

# 5yr survival – colon cancer

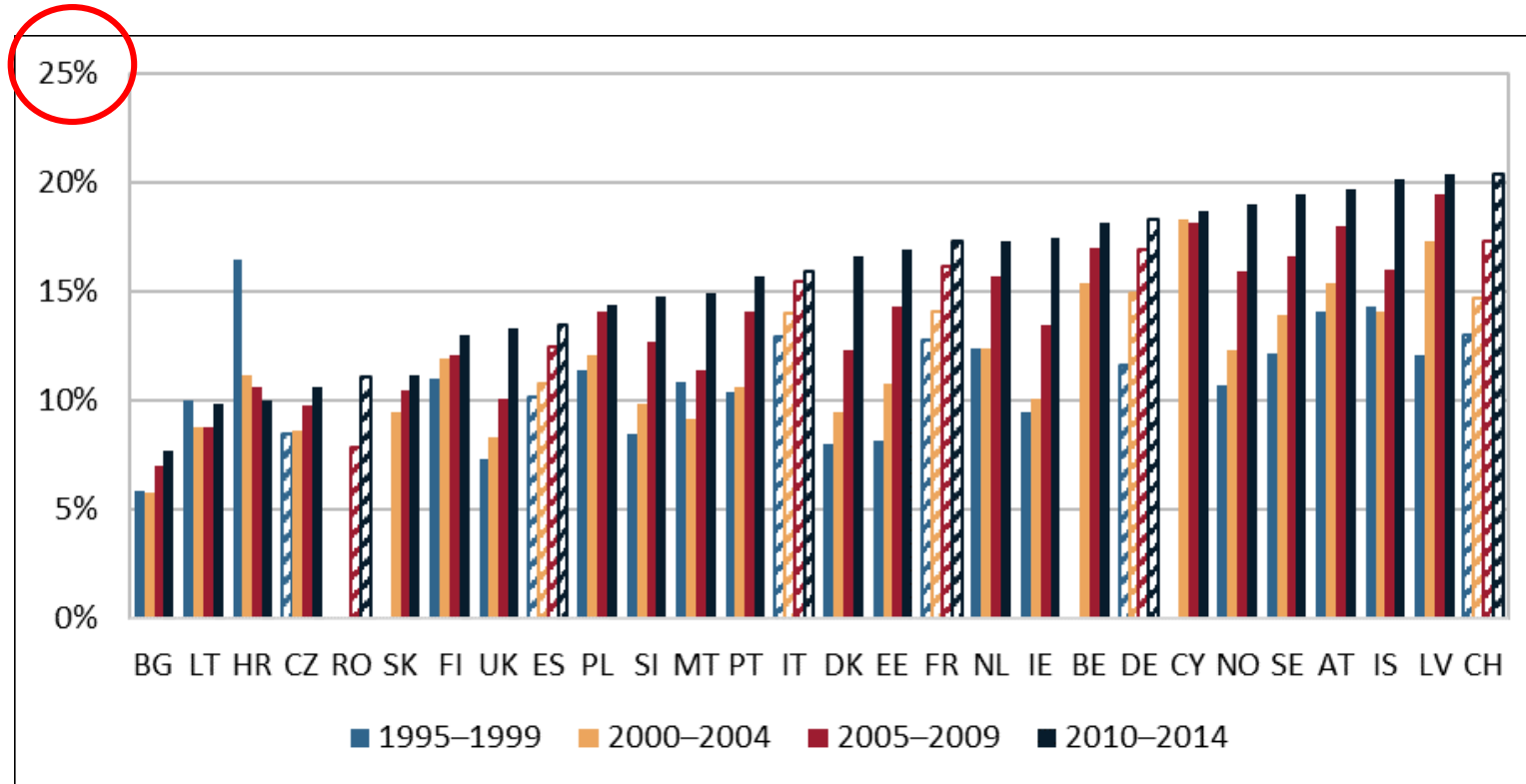


Relatively large country differences in survival (compared to breast cancer)

5-year age-standardized net survival rates for colon cancer in adult patients (15–99 years), 1995–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data. Hatched bars in CY indicate less reliable estimates. Source: Allemani et al (2015+2018)

# 5yr survival – lung cancer



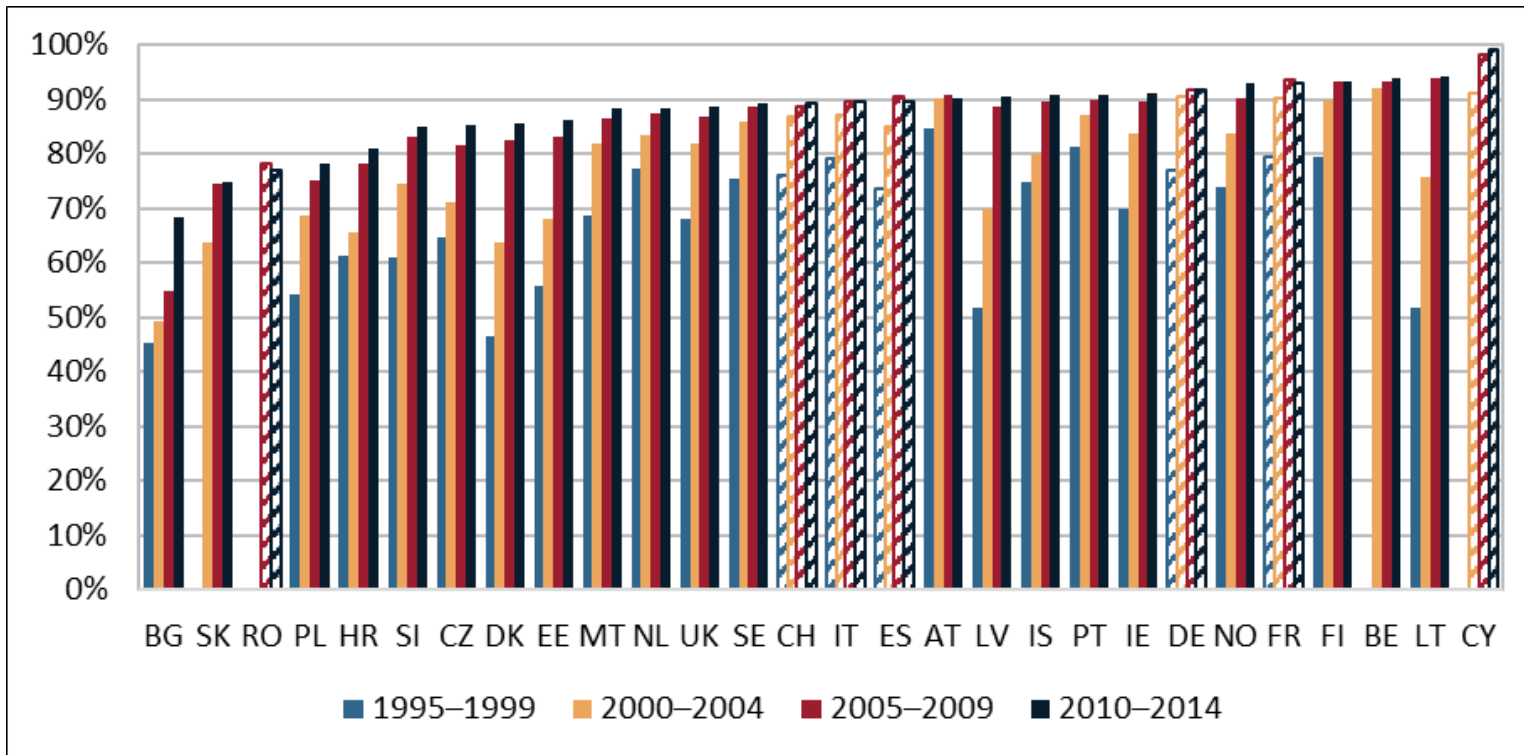
Very large country differences in survival

5-year age-standardized net survival rates for lung cancer in adult patients (15–99 years), 1995–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data.

Source: Allemani et al (2015+2018)

# 5yr survival – prostate cancer

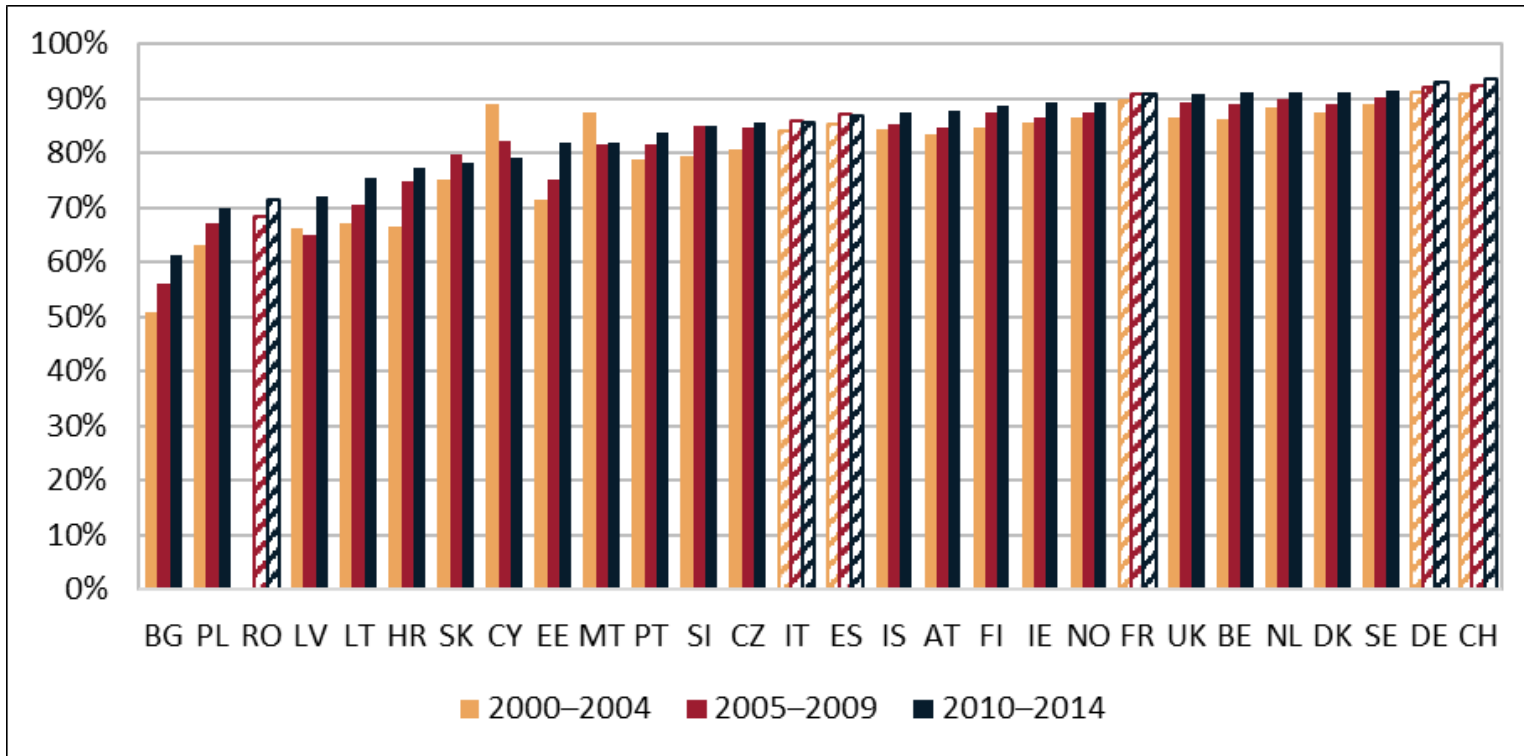


Many countries achieved comparatively similar survival (18 countries in the range of 88% to 94%)

5-year age-standardized net survival rates for prostate cancer in male adult patients (15–99 years), 1995–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data. Hatched bars in CY indicate less reliable estimates. Source: Allemani et al (2015+2018)

# 5yr survival – malignant melanoma



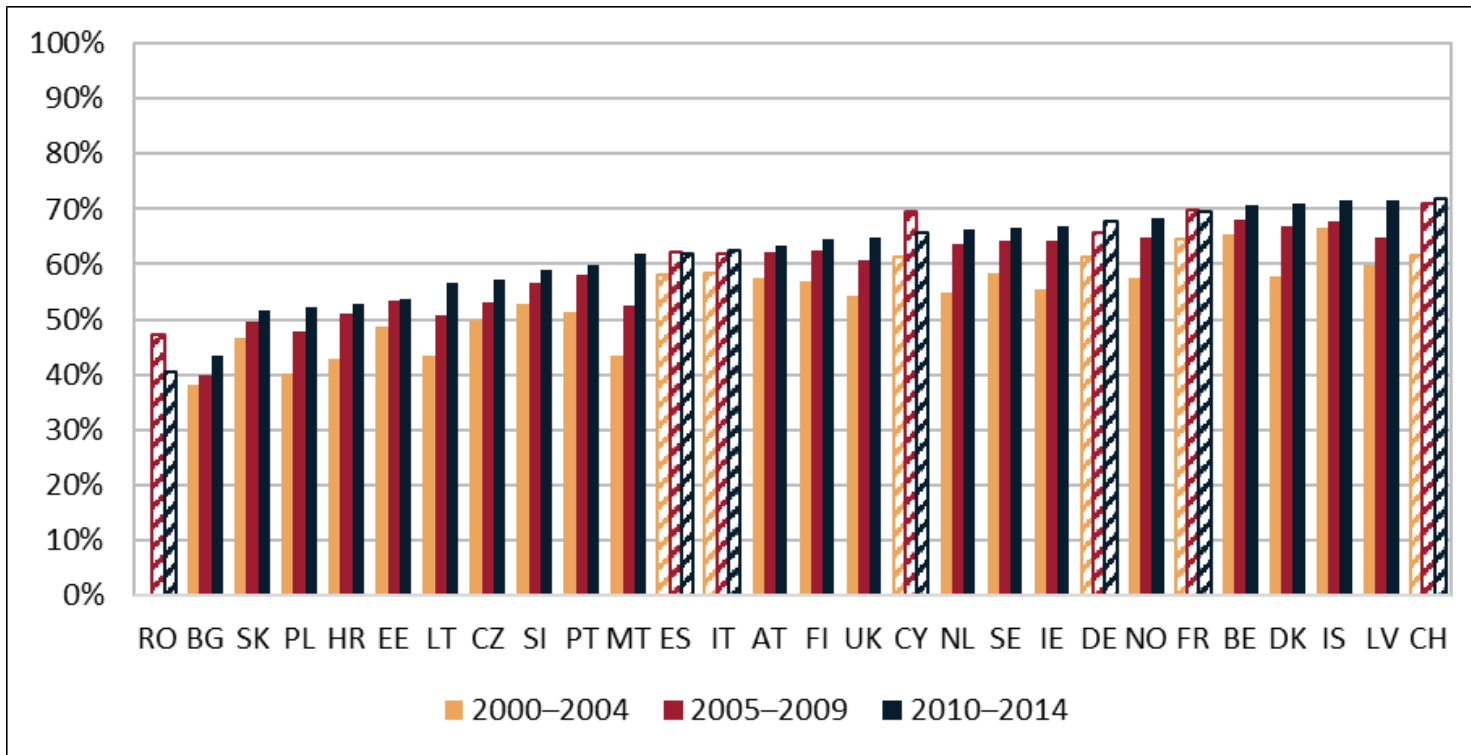
Many countries achieved comparatively similar survival (13 countries in the range of 88% to 94%)

5-year age-standardized net survival rates for malignant melanoma in adult patients (15–99 years), 2000–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data.

Source: Allemani et al (2015+2018)

# 5yr survival – lymphoid cancers



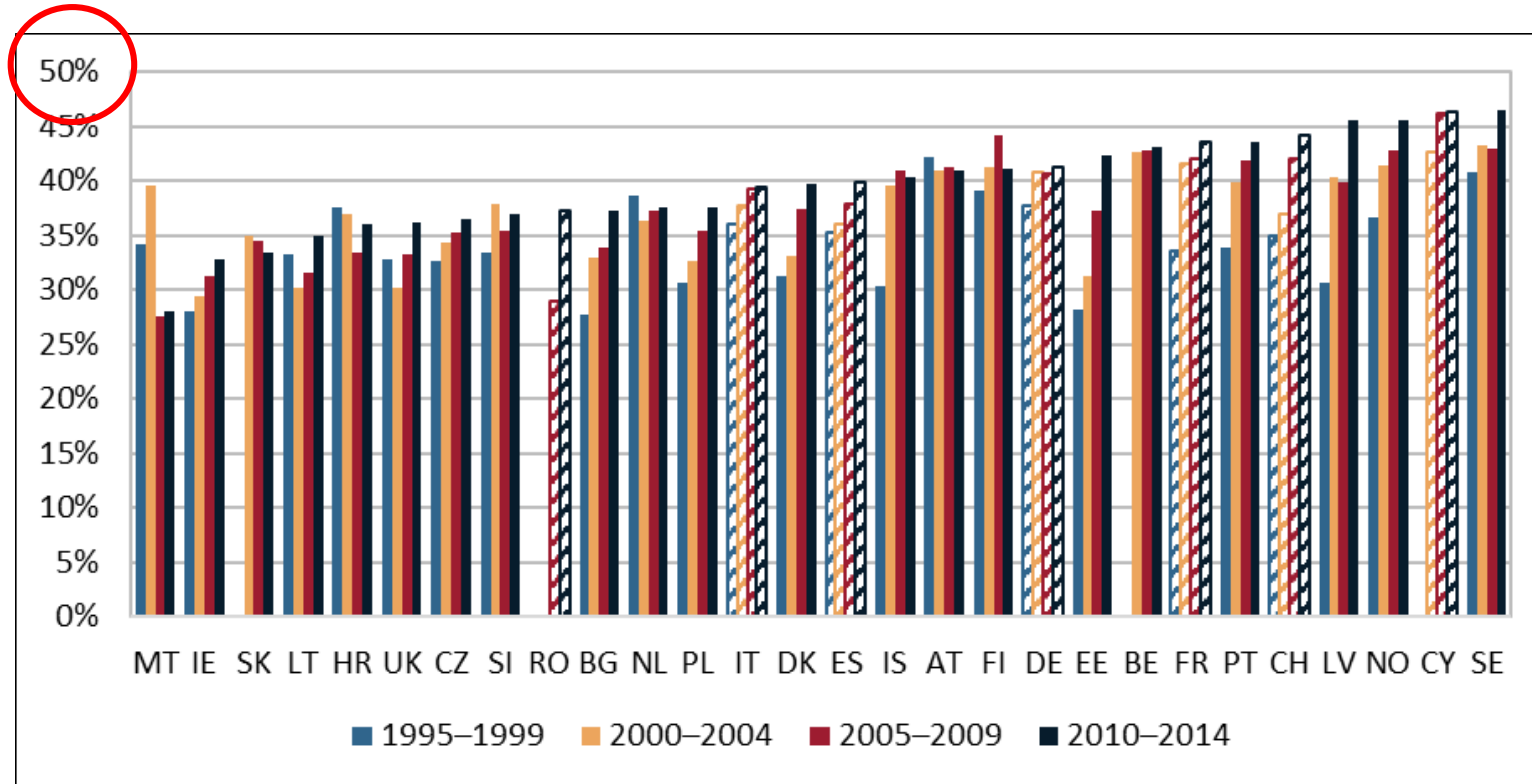
Large country differences in survival

5-year age-standardized net survival rates for lymphoid cancers in adult patients (15–99 years), 2000–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data. Hatched bars in CY indicate less reliable estimates. Source: Allemani et al (2015+2018)



# 5yr survival – ovarian cancer



Relatively large country differences in survival

5-year age-standardized net survival rates for ovarian cancer in adult patients (15–99 years), 1995–2014

Notes: Hatched bars in CH, DE, ES, FR, IT, and RO indicate that national estimates are based on regional data. Hatched bars in CY indicate less reliable estimates. Source: Allemani et al (2015+2018)

# Explaining trends in survival and mortality

- Past advances in diagnostics and treatment are transforming cancer from an acute to a chronic disease
  - E.g. 5-year survival over 90% in breast cancer, prostate cancer, and malignant melanoma in the best-performing countries
- Future increases in survival require further advances in diagnostics and treatment
  - **Research and innovation** is necessary but not sufficient (see part 2 below)
  - No improvements in patient outcomes unless **patients gain access to innovations** (see part 3 below), which requires increases in **health care spending** (see 'Economic burden' below)

# Bringing benefits to patients

Part 2: Research and innovation in diagnostics and treatment



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# Key elements

## Aims

- Timely and accurate diagnosis
- Timely access to treatment after diagnosis
- Access to modern treatment modalities (newest cancer medicines, etc.)

## Diagnostics

## Treatment

## Organization of care

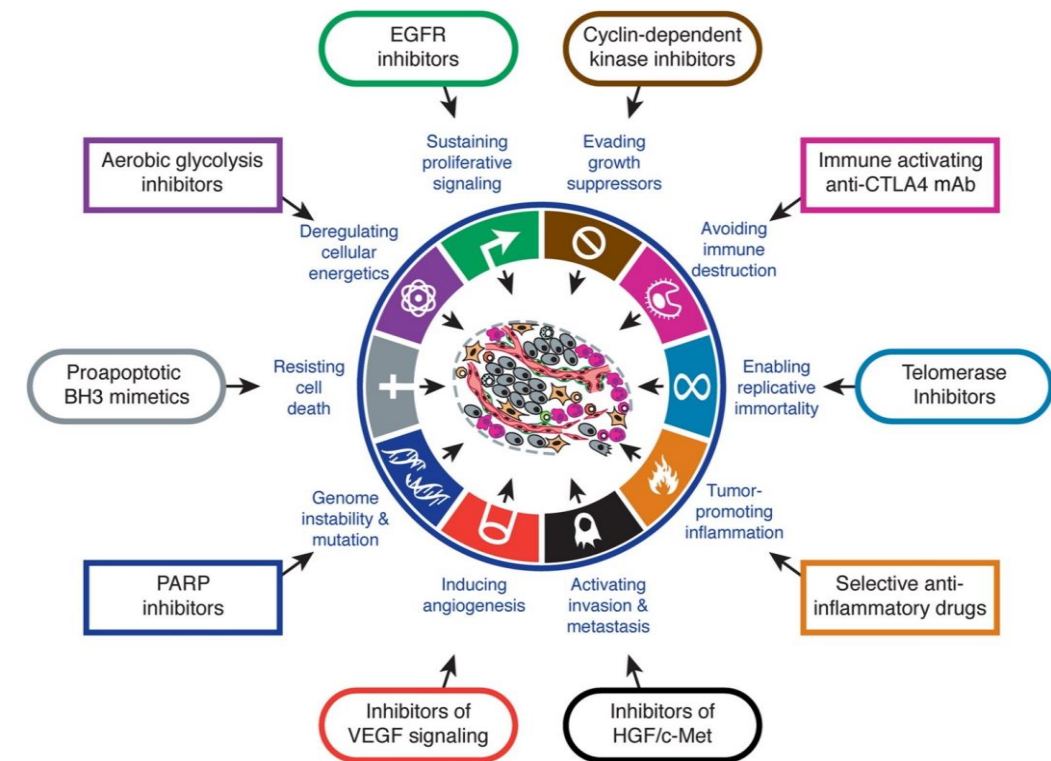
- Standardized care processes to ensure that all patients receive high-quality care
- Multi-disciplinary conference at critical decision points in the treatment process

# Advances in diagnostics

- More accurate diagnosis through (PET-)CT and (PET-)MRI scanners
  - High investment costs
  - Availability and access differs between and within countries
- Machine learning and artificial intelligence (AI) for imaging analysis in digital pathology
  - E.g. diagnosis of melanoma: similar or better performance than trained dermatologists
- Molecular prognostic/predictive testing (biomarkers)
  - Aim is to predict if a patient is likely to respond to a certain treatment → “personalized therapies”
  - E.g. examination of HER2 status in breast cancer
  - Testing is evolving from single markers to broad panels (NGS panels)
  - Tests assessing markers in blood, urine, saliva, and stool samples are being developed
  - Future complex landscape of different combinations of therapies will require extensive testing

# Cancer treatment in the last 30 years

- **Chemotherapy**
  - Cell toxic (affects all cells, not only cancer cells)
  - Often severe side effects
- **Targeted therapy (≈ end of 1990s)**
  - Agents that target cancer-specific mechanisms (“personalized medicine”)
  - 2 types: Small molecules + (monoclonal) antibodies
  - Different toxicity profile and often decreased toxicity
  - Oral administration in some cases
  - Gene/protein expression analyses of tumors are likely to improve treatment accuracy in the near future
- **Immunotherapy (≈ beginning of 2010s)**
  - Activate the body’s immune system to attack the tumor
  - Checkpoint inhibitor therapy
  - Cell-based therapy (CAR-T)



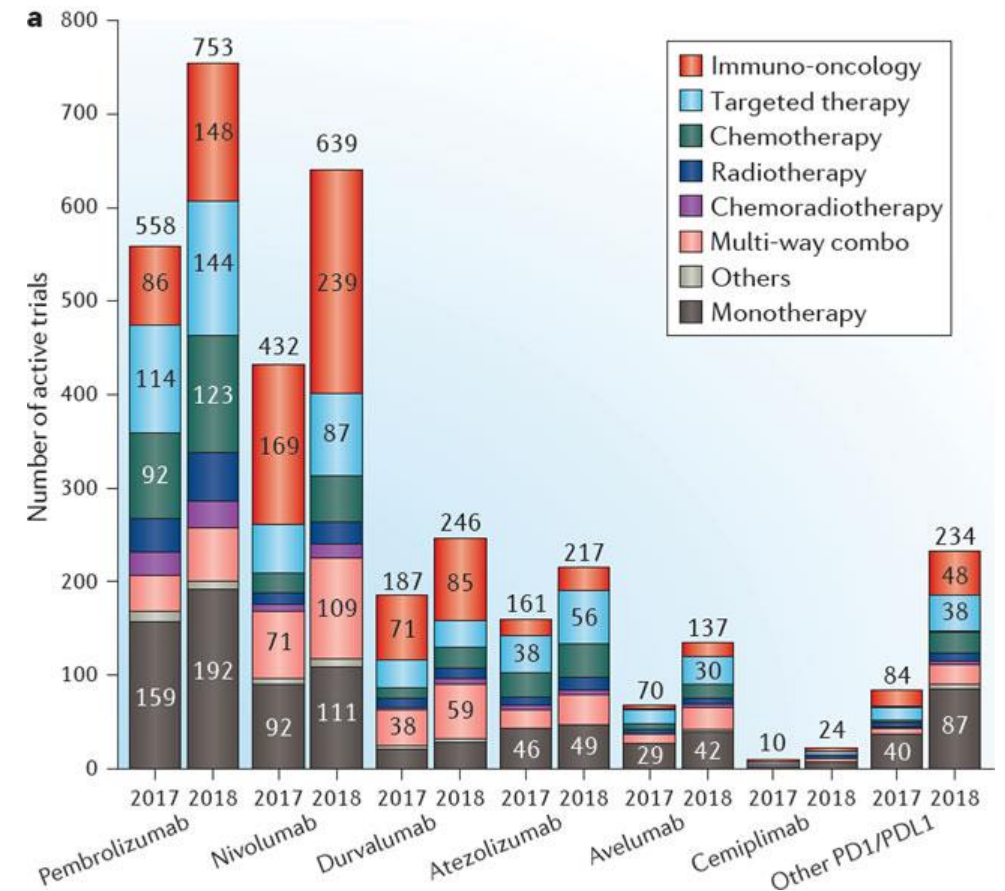
Different targets in modern cancer medicines

Source: Hanahan et al (2011)

# Massive efforts in drug development

## Example: immunotherapy

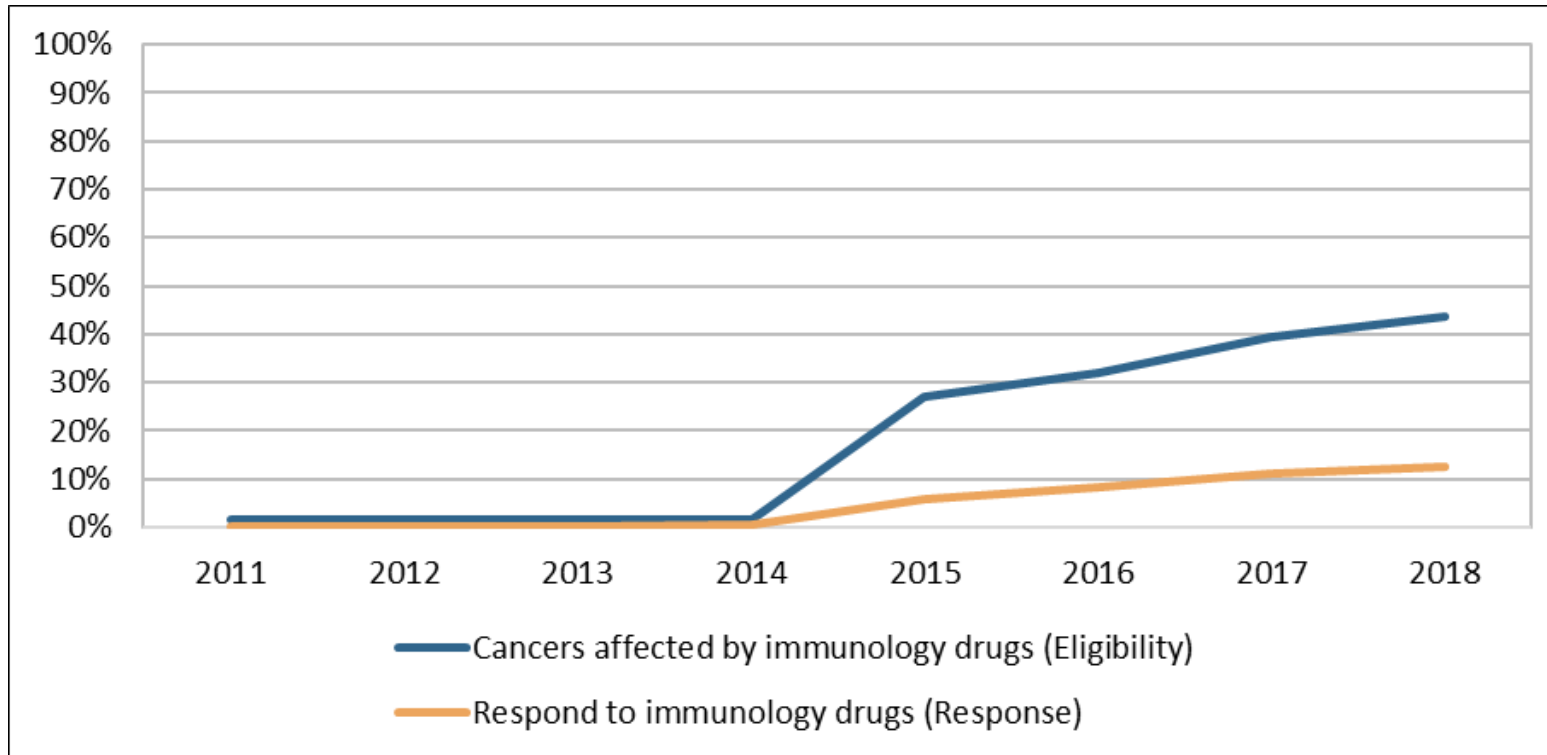
- 2,250 active trials testing anti-PD-1/PD-L1 agents in 2018 compared with 1,502 trials in 2017
- Agents given either alone (monotherapy; 534 trials) or in combination with other therapies (1,716 trials)
- 240 different targets



The immuno-oncology trial landscape in September 2018

Source: Tang et al (2018)

# Immunotherapy in clinical practice



Immunotherapy is still in its infancy

Most patients do not respond to these agents

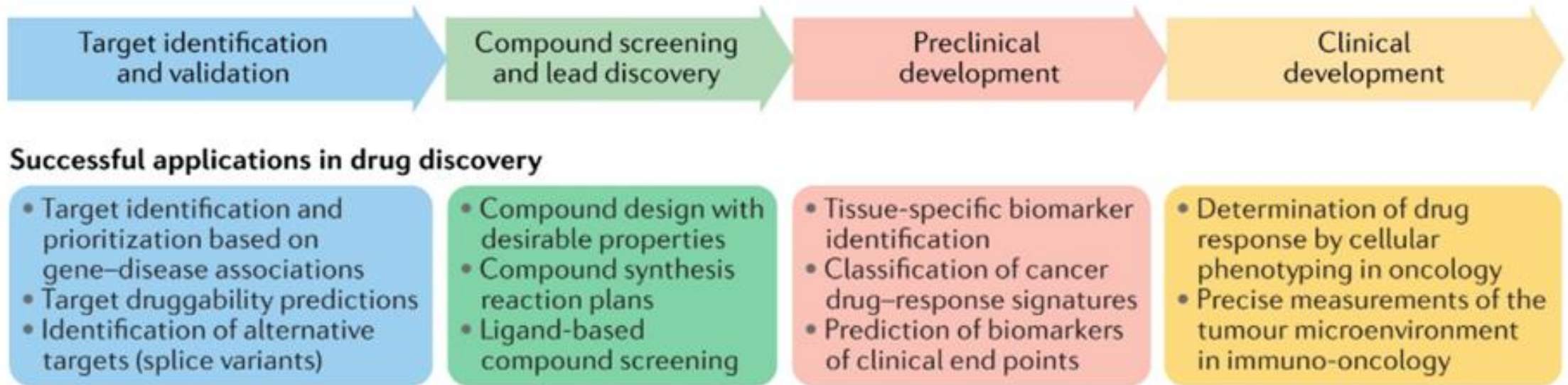
Biomarkers to help select patients need significant further work to ensure that eligible patients (blue line) and responding patients (yellow line) correspond closely

Share of cancer patients who may benefit from and respond to checkpoint inhibitor immunology drugs in the US

Source: Haslam et al (2019)

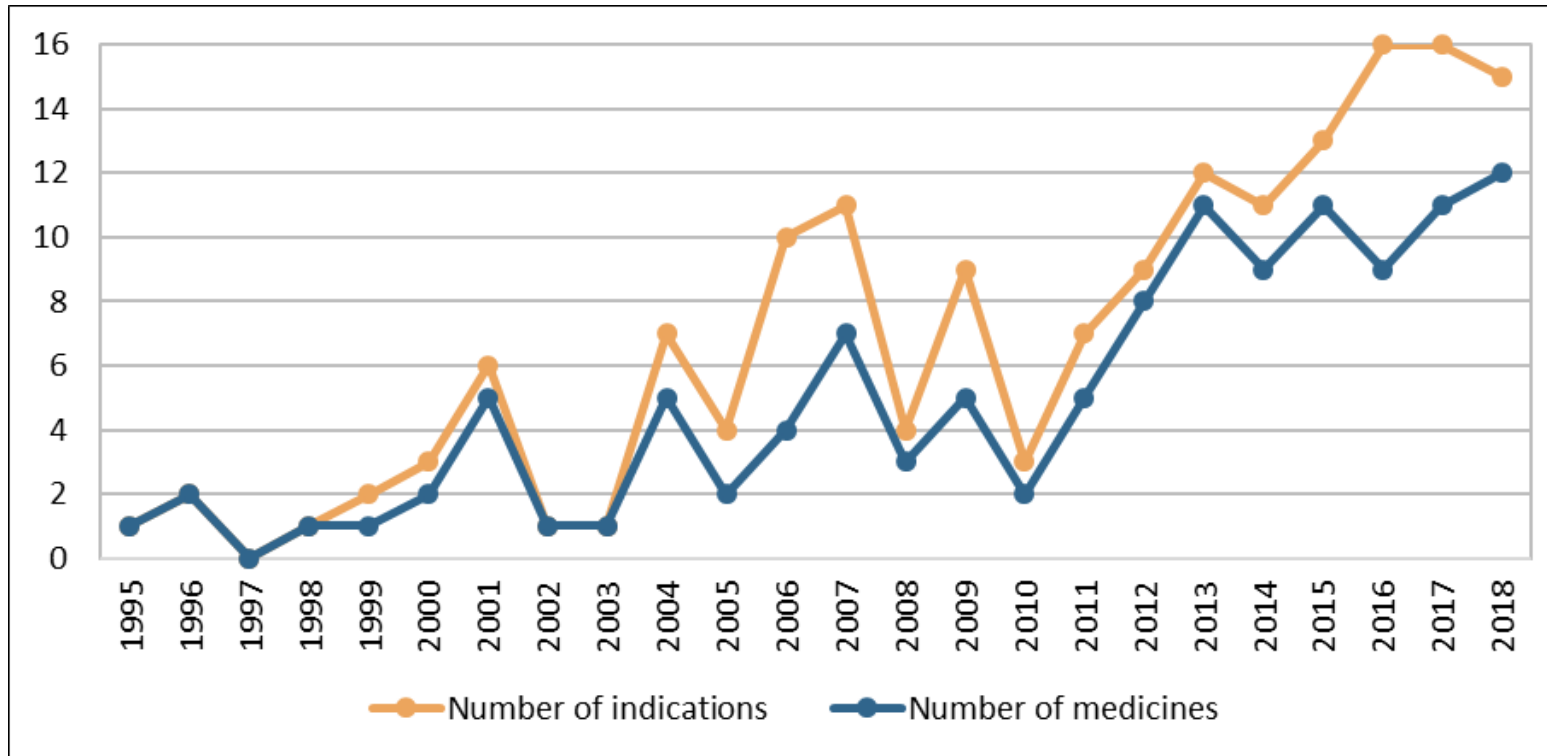


# Application of AI in drug development



Source: Vamathevan et al (2019)

# Growing stream of cancer medicines and indications



118 EMA approvals of new medicines in oncology (ATC groups L01, L02 and some in L04) and 164 indications

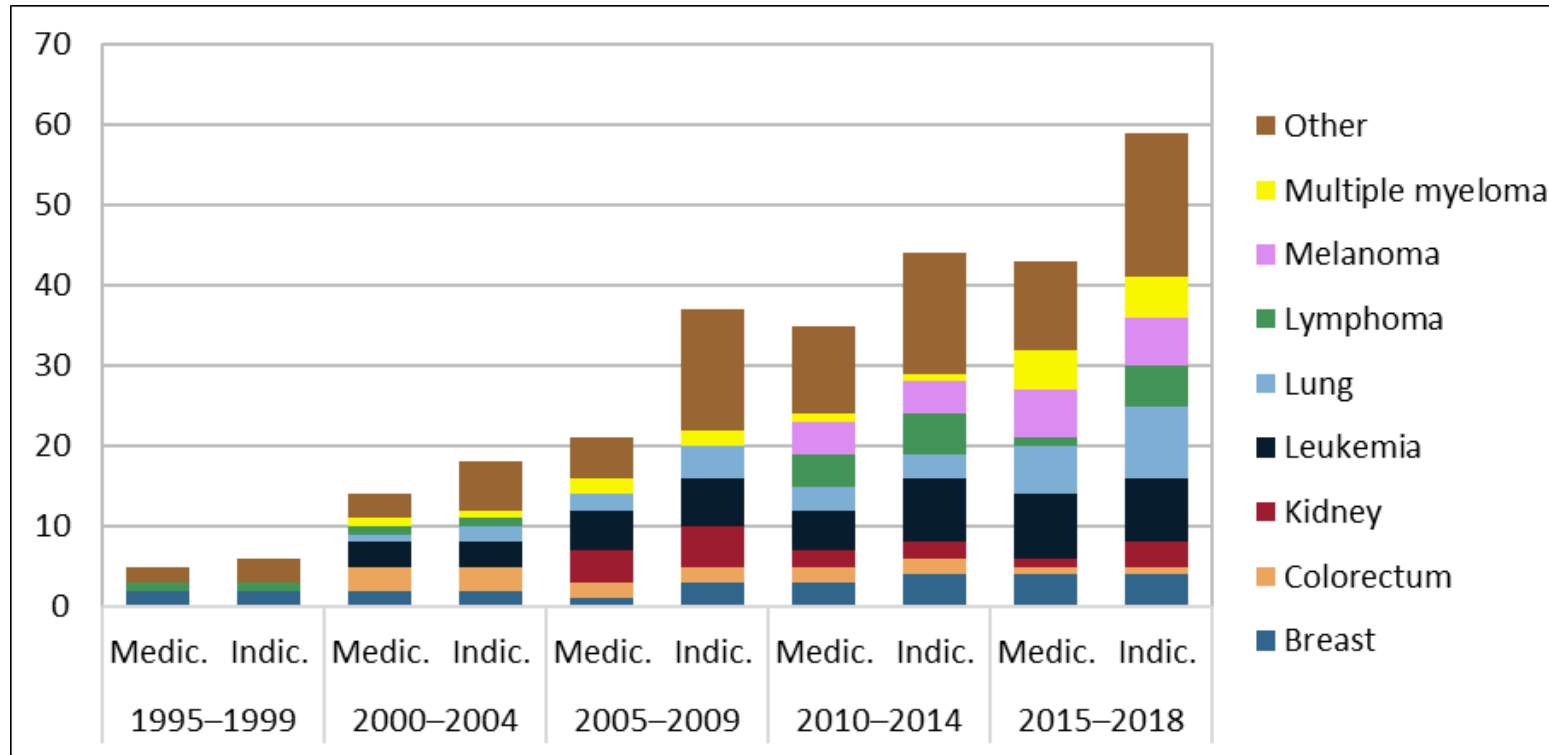
Steep increase in the number of approved cancer medicines and indications

Number of EMA-approved cancer medicines and indications, 1995–2018

Notes: Indications refer to label extensions to cancer types in addition to the initially approved cancer type

Source: EMA

# Many medicines for different cancer types



Approvals are unevenly spread across cancer types

Many recent approvals for hematologic cancers

Number of EMA-approved medicines and indications by cancer type

Notes: First column = number of medicines ("Medic.") by main indication at time of initial drug approval;  
Second column = number of approved indications ("Indic.") by cancer type.

Source: EMA

# Medicines can go through a sequence of label extensions following initial approval

**Initial approval** (e.g. metastatic colorectal cancer)



**Cancer type** (e.g. breast cancer)



**Disease stage** (e.g. locally advanced)



**Treatment line/stage** (e.g. first line)



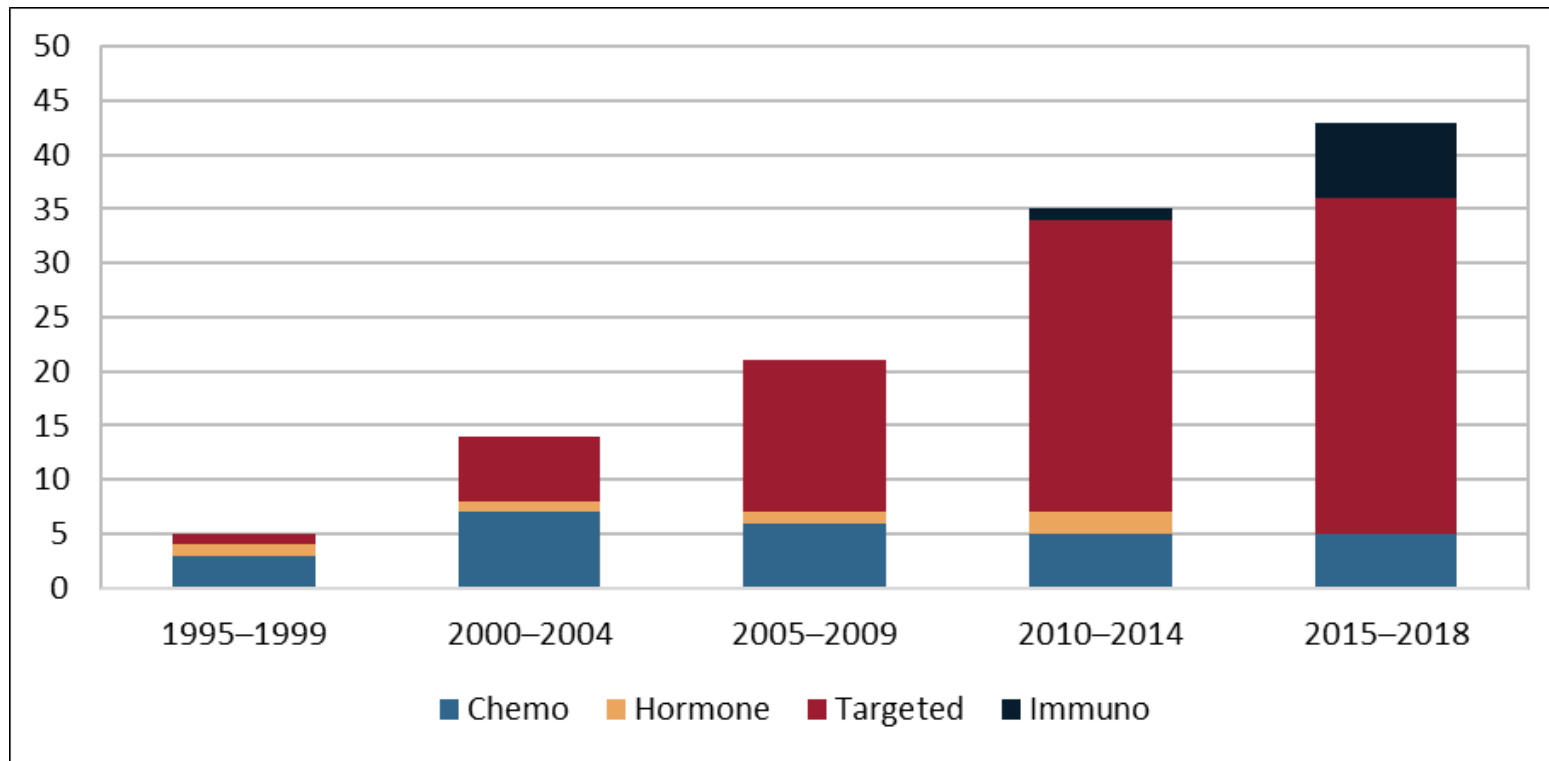
**Treatment regimen** (e.g. as monotherapy, initial approval being in combination with chemotherapy)

**Use in new route of administration**  
(e.g. subcutaneous as additional option to intravenous)

**Patient sub-population**  
(e.g. indicated for children or indicated only for patients with KRAS wild type tumours)

Source: The Expanding Value Footprint of Oncology Treatments (Office of Health Economics, 2014)

# Increasing approval of targeted therapies and immunotherapies



Number of EMA-approved medicines by type of therapy

Source: EMA

# Bringing benefits to patients

## Part 3: Patient access to medicines



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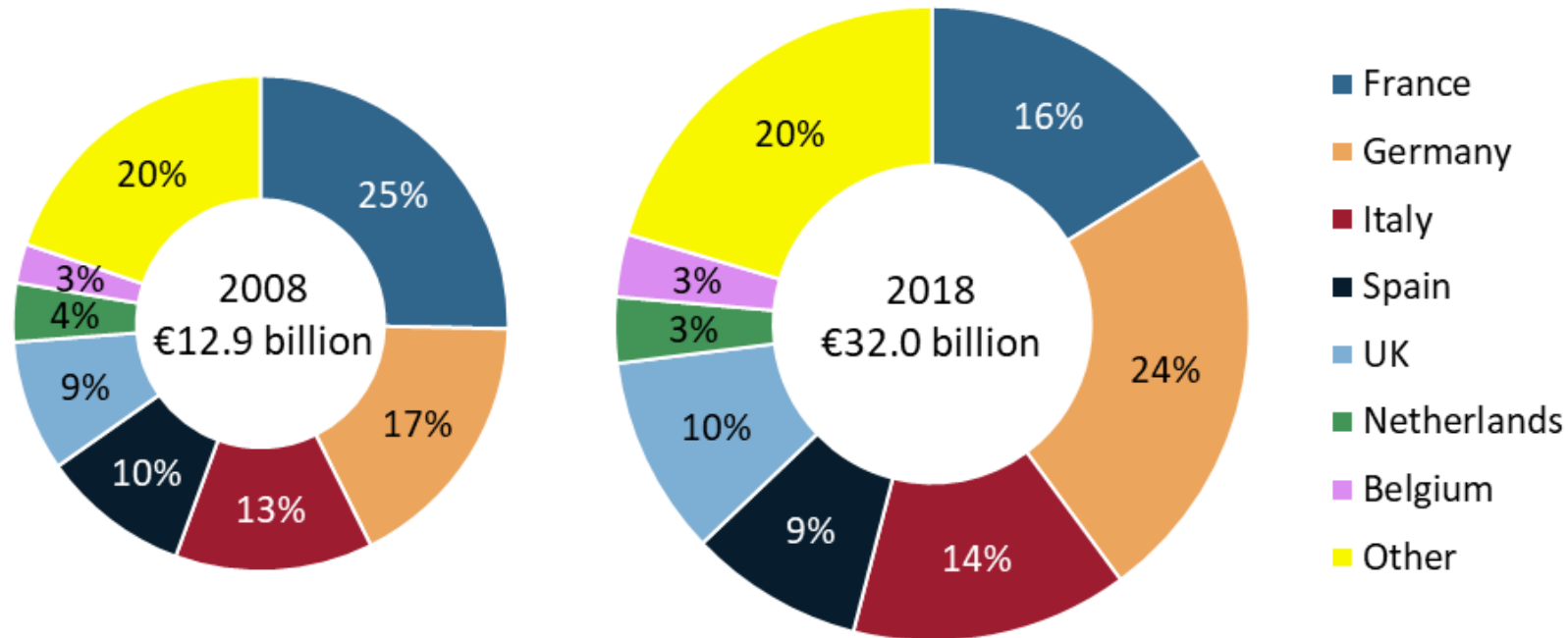
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# Measurement of patient access to medicines

- Important for patient access is:
  - **Fast access** = time from EMA approval to first patients treated
  - **Broad uptake** = use in clinical practice in eligible patients
- Based on country-level data, access can be measured in value or volume
- Measurement of value:
  - Euros (€)
- Measurement of volume:
  - Single medicines: milligram (mg)
  - Multiple medicines: standard weekly dose (SWD), based on the recommended dose in milligram for a standard patient (70–80 kg body weight and body surface 1.7–1.8 m<sup>2</sup>)

# Access to cancer medicines (sales value)



Total cost of cancer medicines (in current prices) in Europe, 2008 & 2018

Notes: Cancer medicines in groups ATC L01, L02, L04

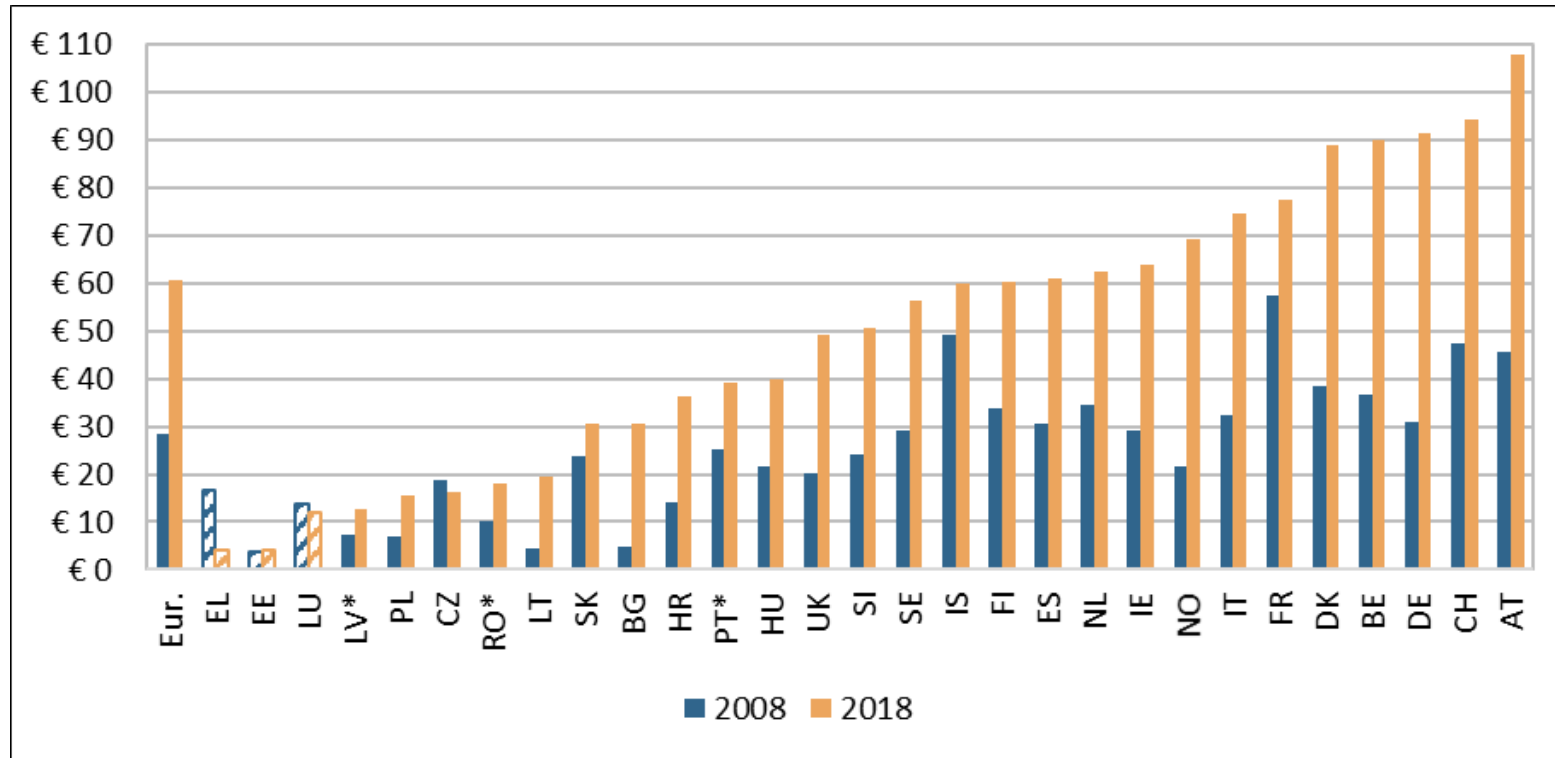
Source: IQVIA

Many reasons for increased spending over time:

- Higher prices of new medicines (cost per treatment)
- More cancer patients
- More rounds of treatment due to increased survival
- Many newly approved medicines (86) and indications (115)
- New medicines for previously untreated patient groups
- More adjuvant treatment
- Increasing use of combination therapies



# Access to cancer medicines (sales value)



Large country differences in spending on cancer medicines, and no signs of shrinking country differences over time

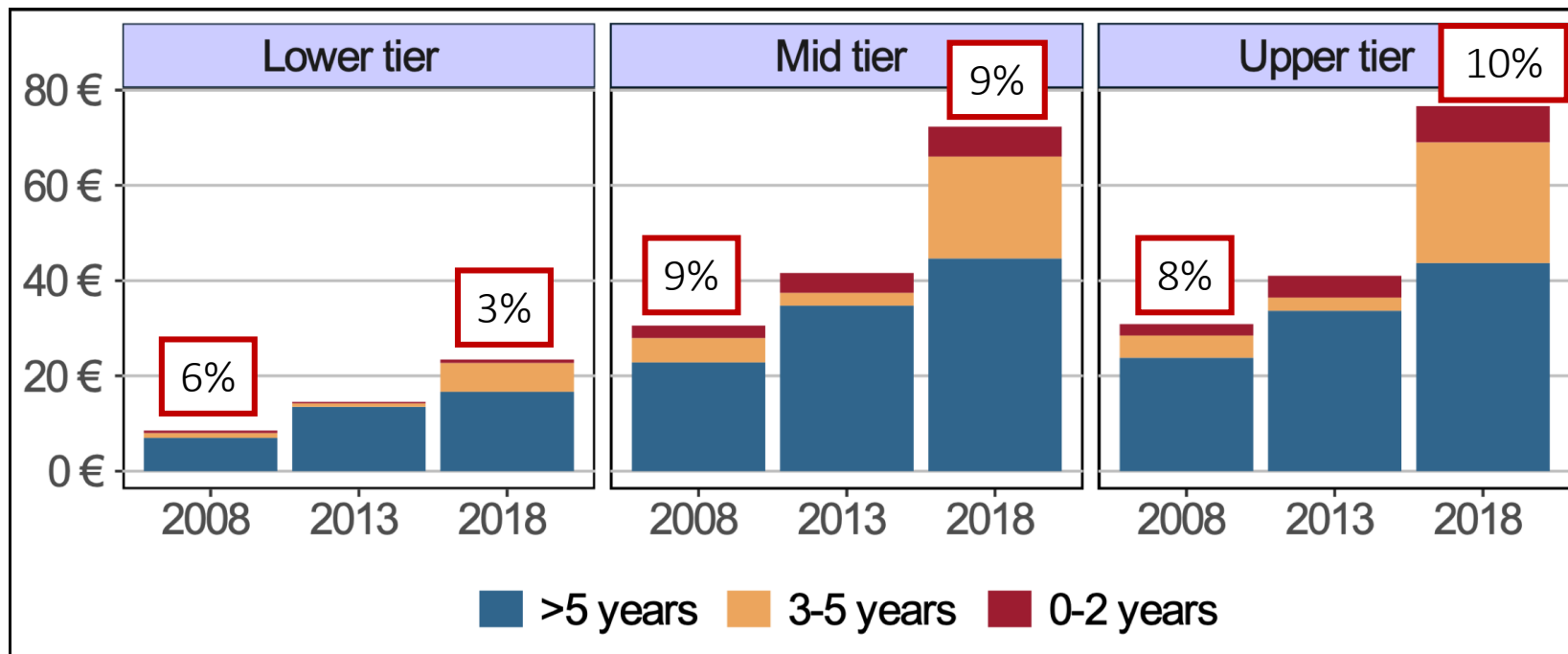
Poorer countries spend around one third of the amount of wealthier countries

Cost of cancer medicines per capita (in 2018 price levels and exchange rates), 2008 & 2018

Notes: Eur. = Europe. Hatched bars indicate that data for EE, EL, and LU only comprise retail sales. CY and MT are missing due to lack of data. \* The values in 2008 are from 2014 for LV, from 2009 for RO, and from 2010 for PT.

Source: IQVIA

# Access to newest cancer medicines



Small and stable share of sales of newest drugs (approved max. 2 years ago), ...  
... ranging from 3% in poorer countries to 10% in the wealthiest countries in 2018

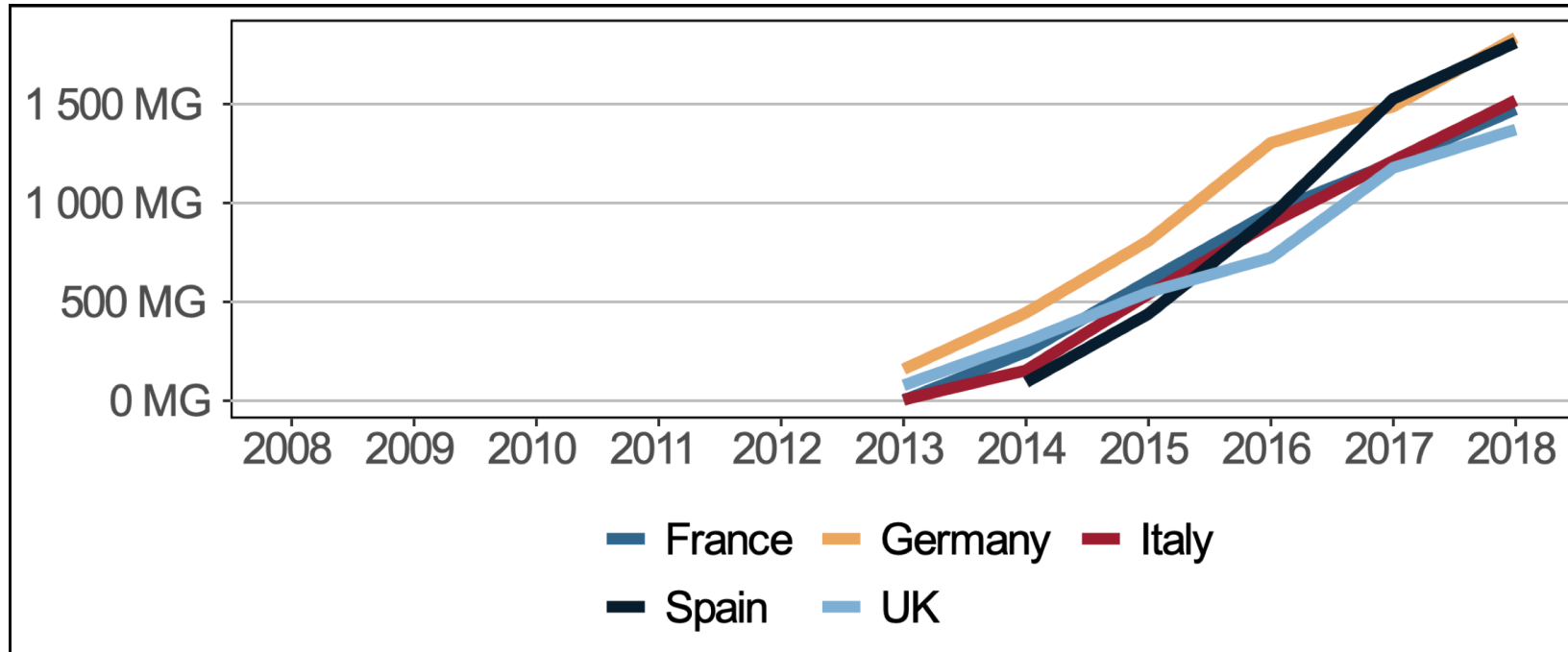
Increasing share of sales of semi-new drugs (approved 3-5 years ago) due to immuno-therapies approved in 2015

Sales of cancer medicines (in € per capita) by time since EMA approval and group of country

Notes: Lower tier = BG, HR, CZ, HU, LV, LT, PL, PT, RO, SK, SI; Mid tier = FR, DE, IT, ES, UK; Upper tier = AT, BE, DK, FI, IS, IE, NL, NO, SE, CH

Source: IQVIA

# Access - breast cancer medicines (volume)



Pertuzumab

EMA approval: March 2013

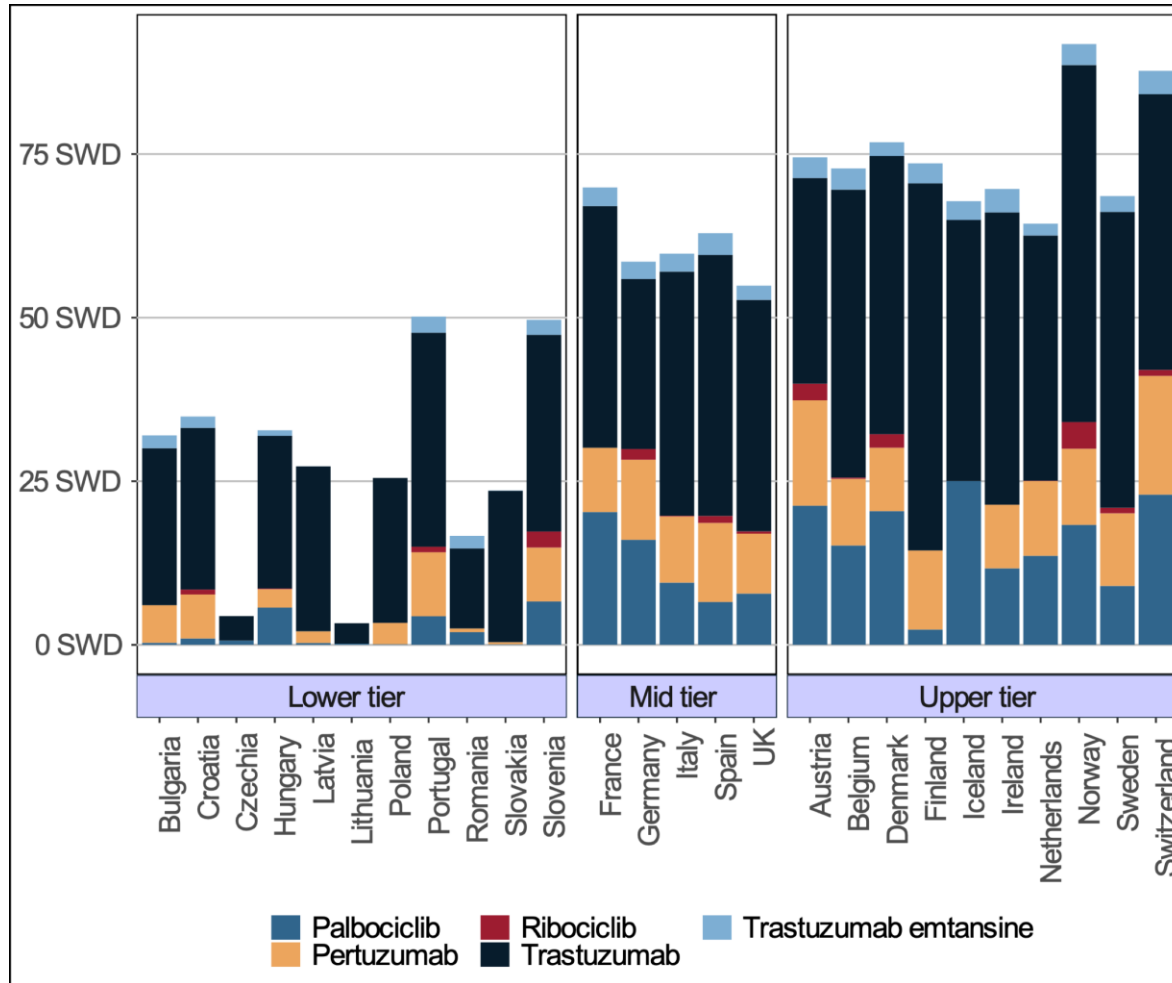
Slowest access in Spain, but  
lowest uptake in the UK in  
2016–2018

Uptake of pertuzumab expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from breast cancer

Source: IQVIA

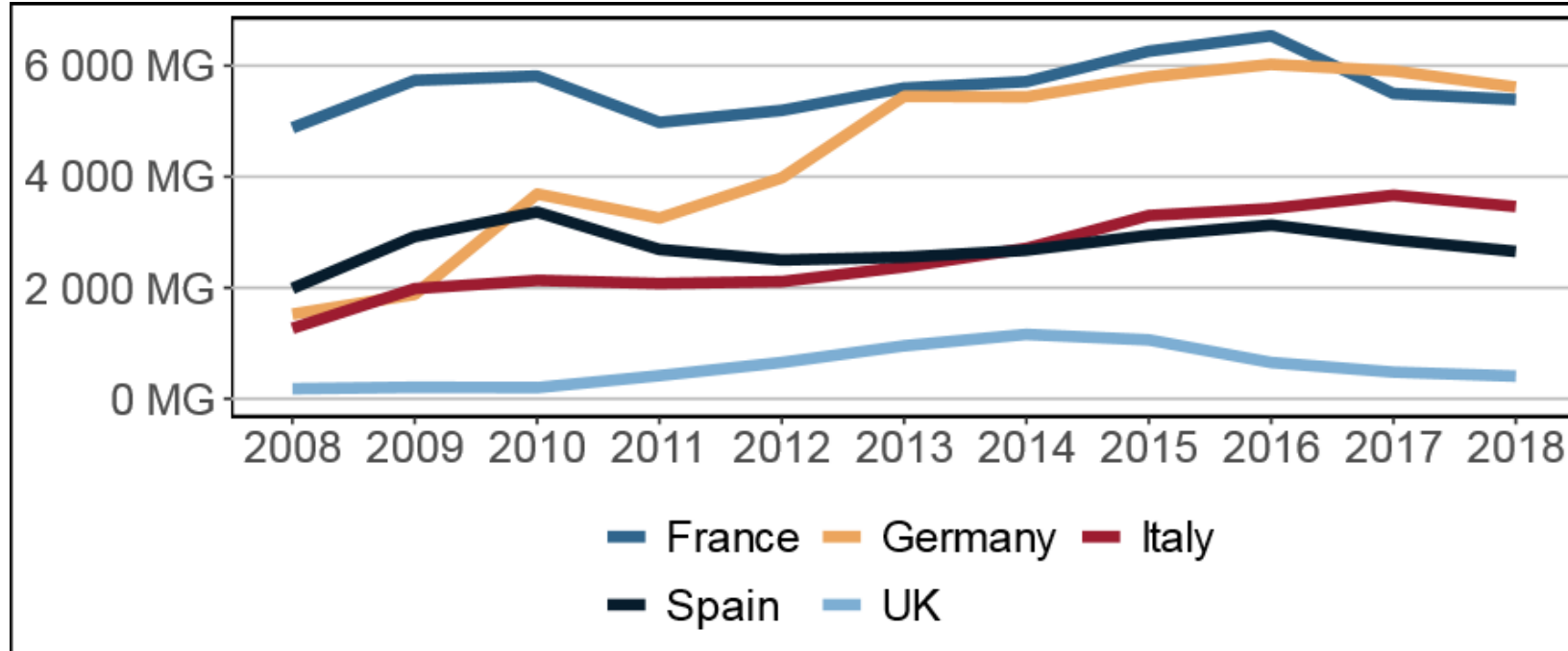
# Access - breast cancer medicines (volume)



Fairly similar uptake in wealthier countries

Much lower uptake ( $\approx 1/3$ ) in poorer countries than in most wealthier countries

# Access - colorectal cancer medicines (volume)



Bevacizumab

EMA approval: January 2005

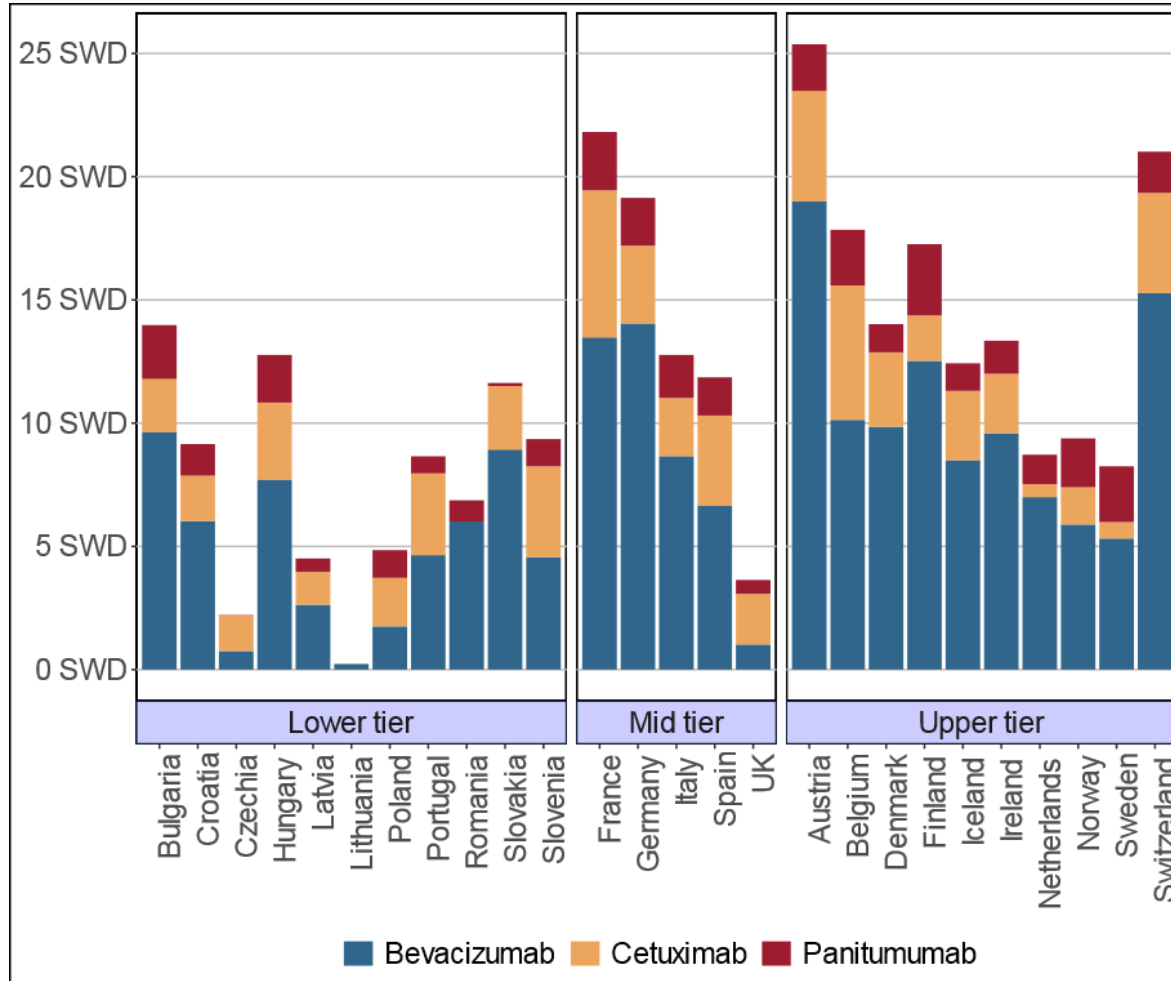
Very low uptake in the UK compared to France and Germany

Uptake of bevacizumab expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from colorectal cancer

Source: IQVIA

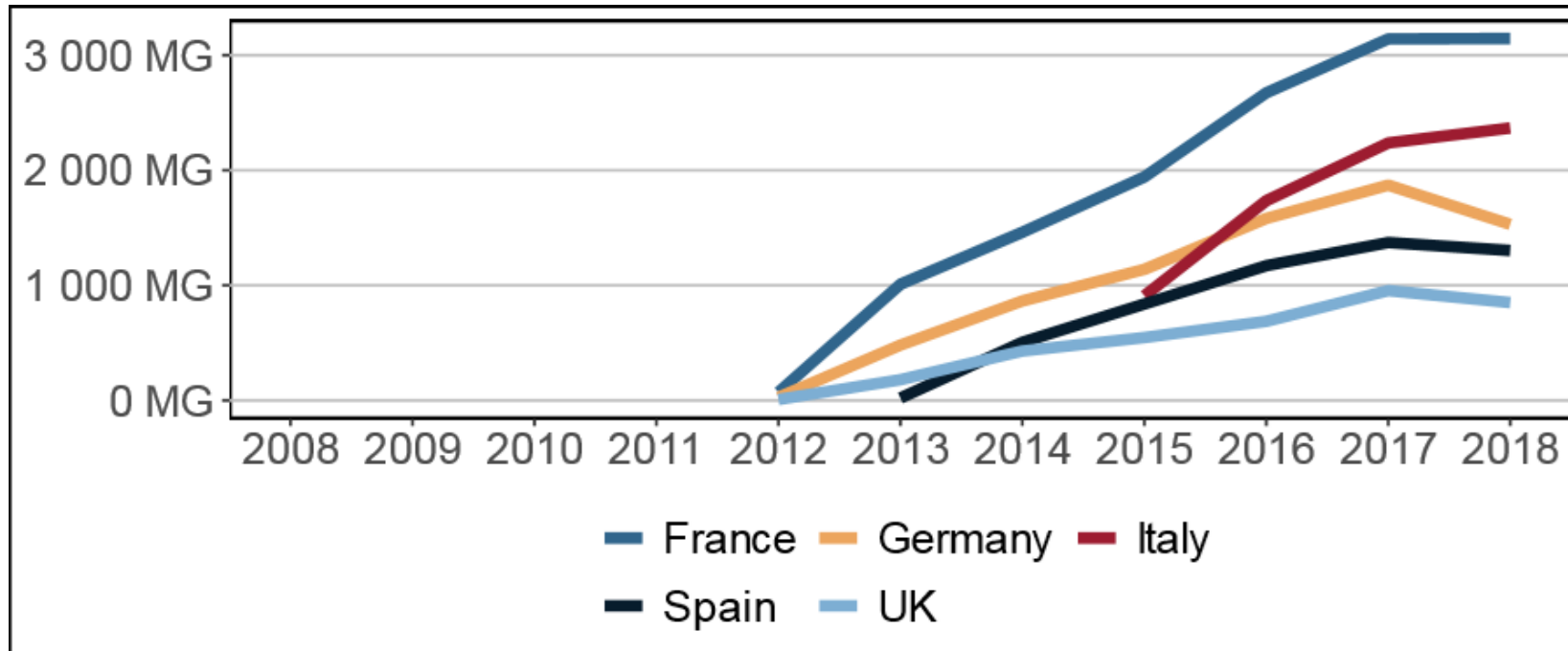
# Access - colorectal cancer medicines (volume)



Large differences in uptake even within country groups

Some poorer countries have as high uptake as some of the wealthiest countries

# Access - lung cancer medicines (volume)



Crizotinib

EMA approval: October 2012

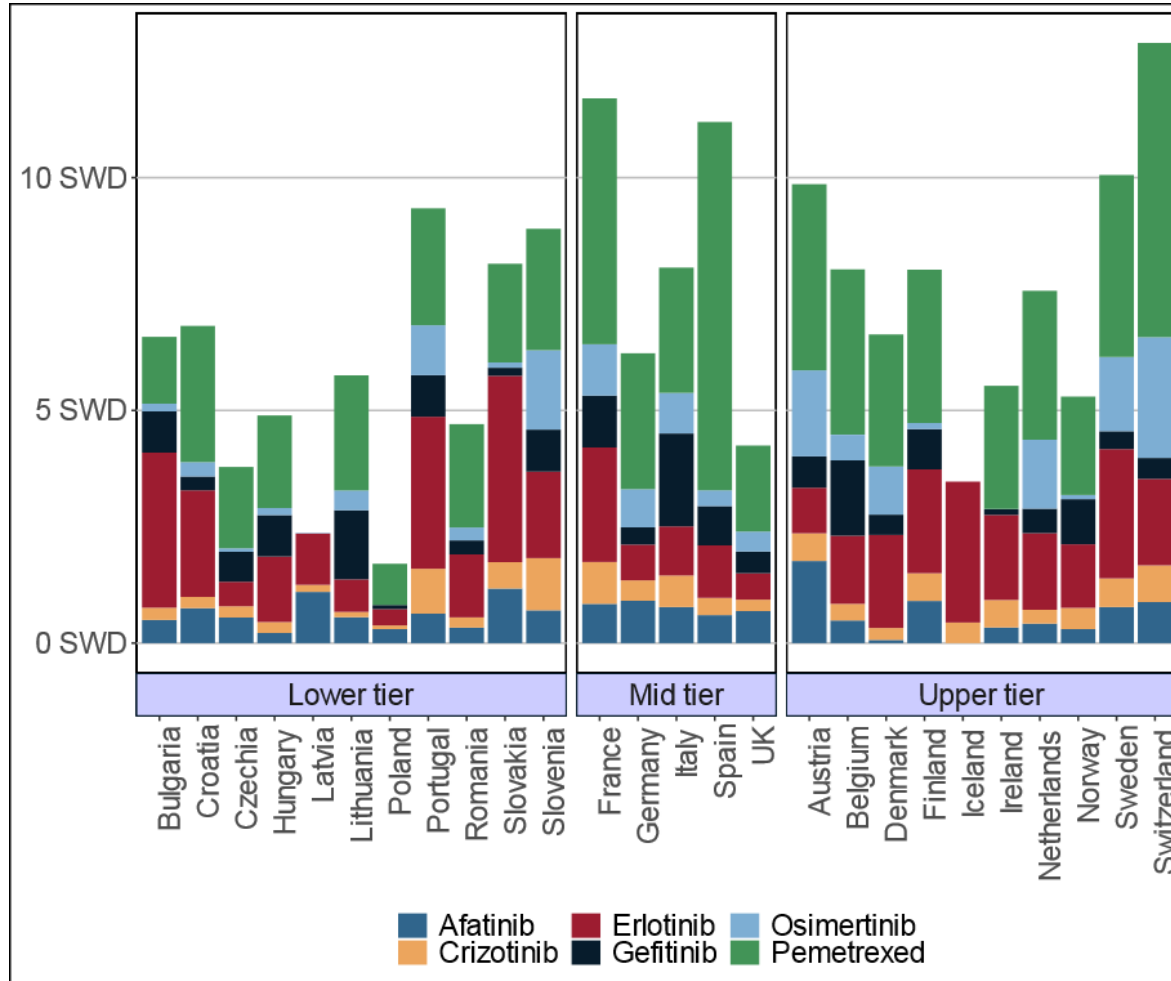
Slowest access in Italy and Spain, but lowest uptake in the UK 2014–2018

Uptake of crizotinib expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from lung cancer

Source: IQVIA

# Access - lung cancer medicines (volume)

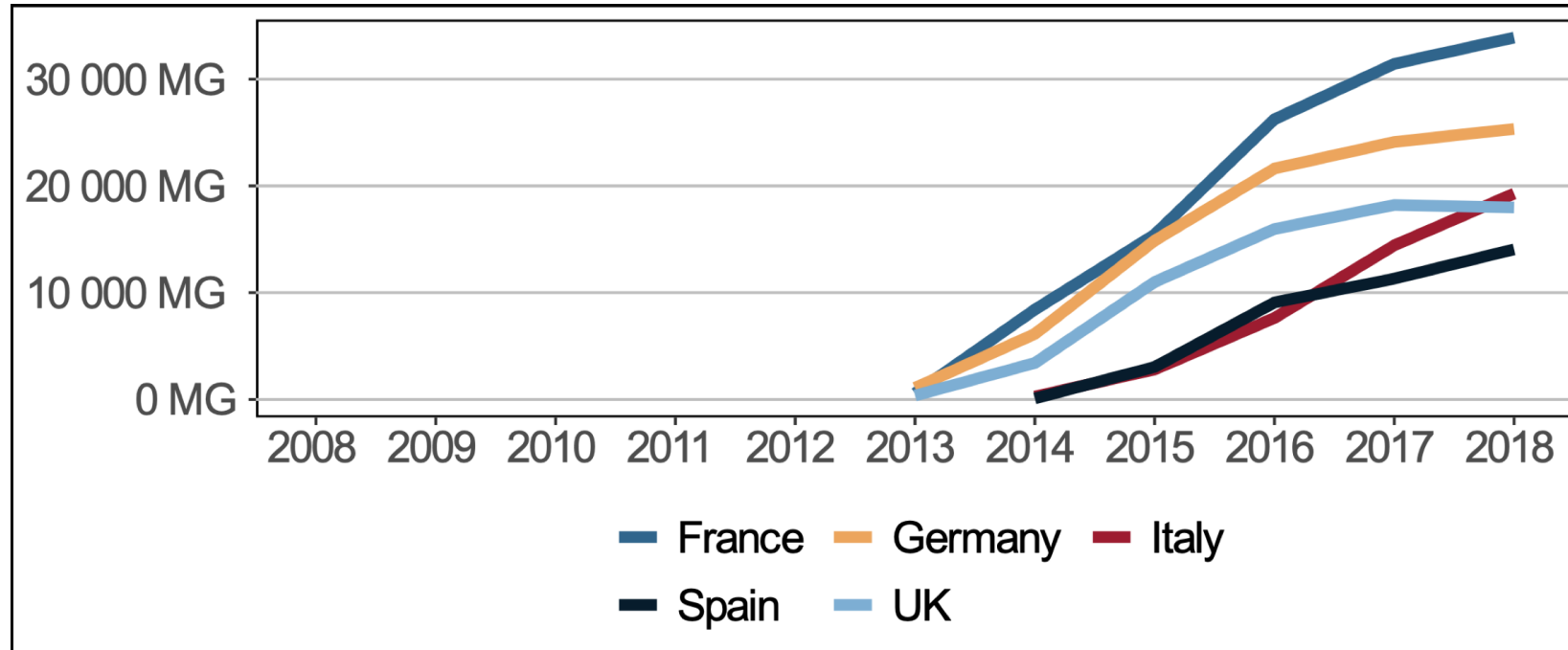


Large differences in uptake even within country groups

Some poorer countries have as high uptake as some of the wealthiest countries



# Access - prostate cancer medicines (volume)



Enzalutamide

EMA approval: June 2013

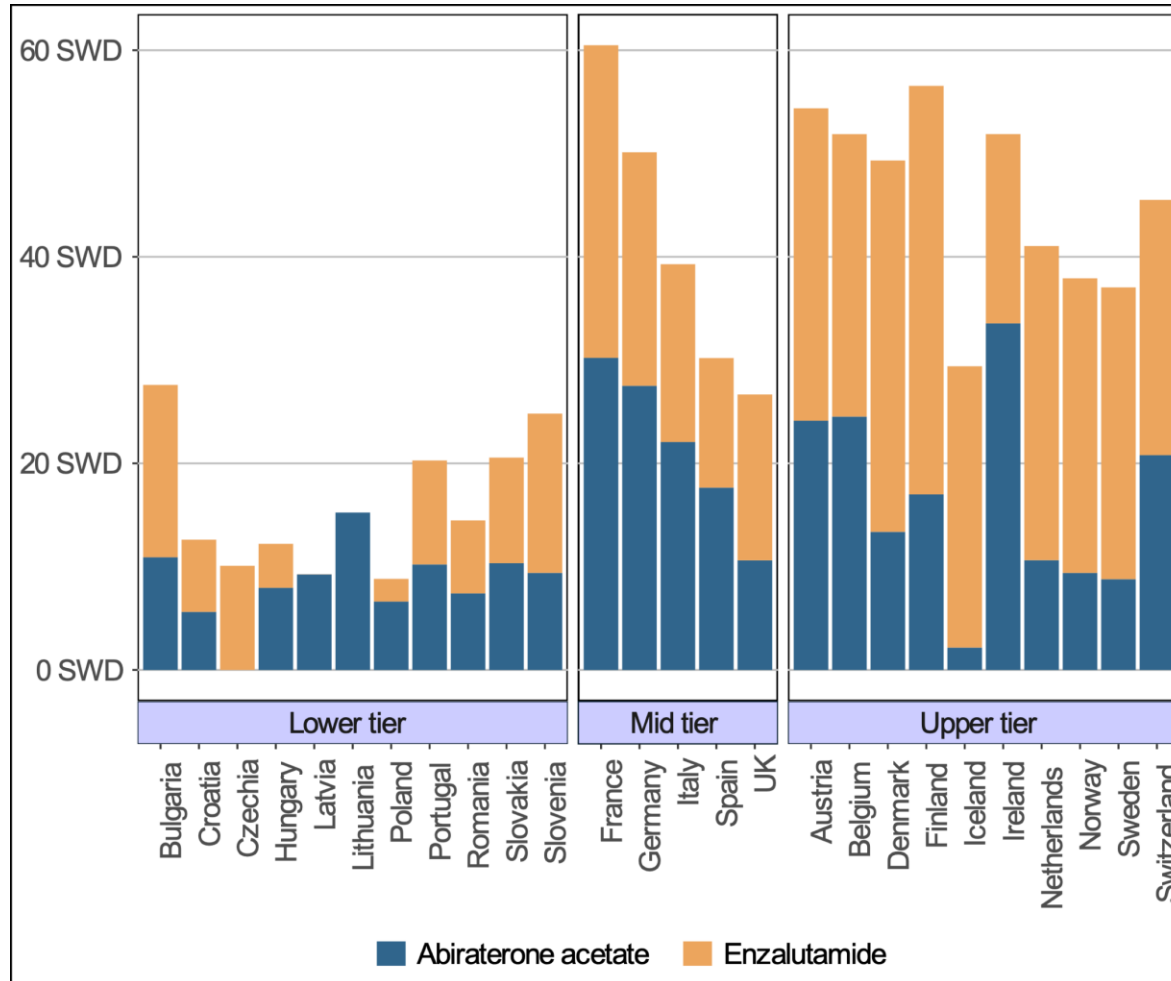
Slowest access and also lowest uptake in Italy and Spain

Uptake of enzalutamide expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from prostate cancer

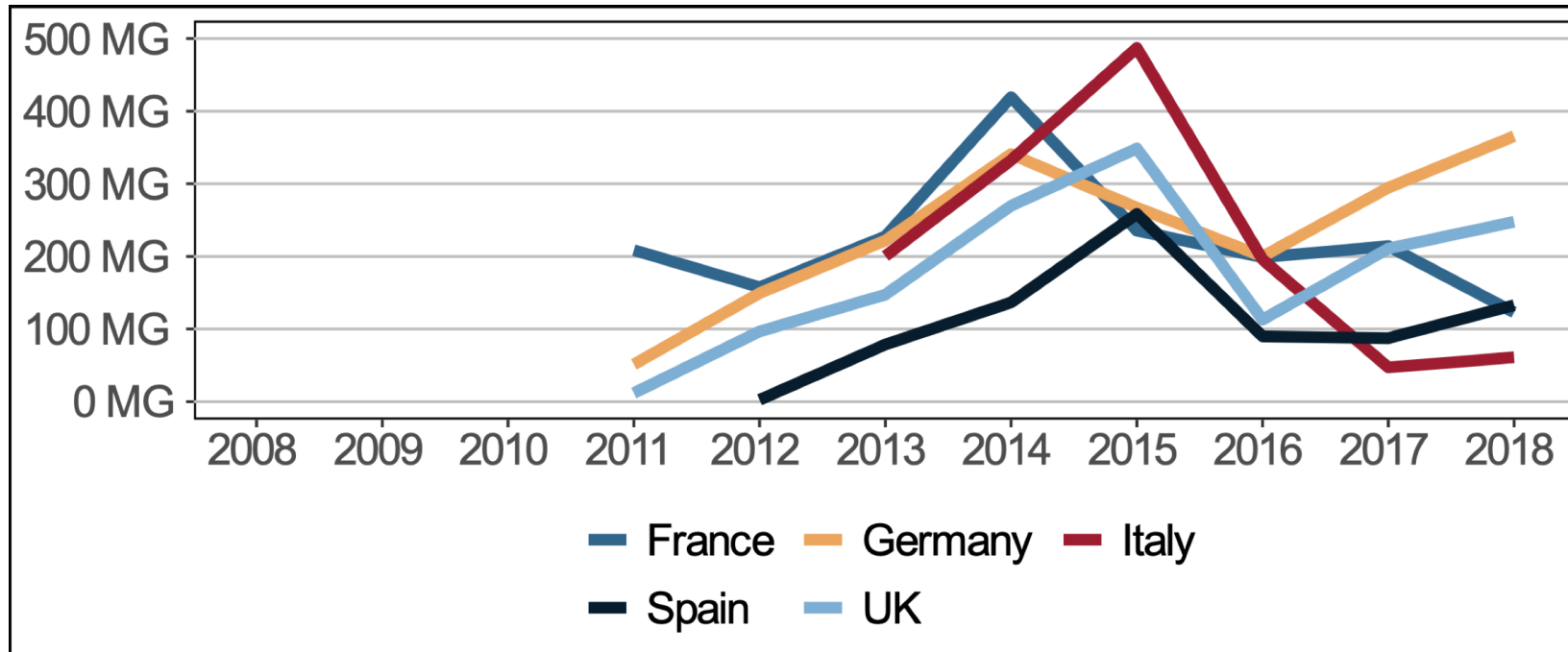
Source: IQVIA

# Access - prostate cancer medicines (volume)



Fairly similar uptake among the wealthiest countries and among poorer countries

# Access - malignant melanoma medicines (volume)



Ipilimumab

EMA approval: July 2011

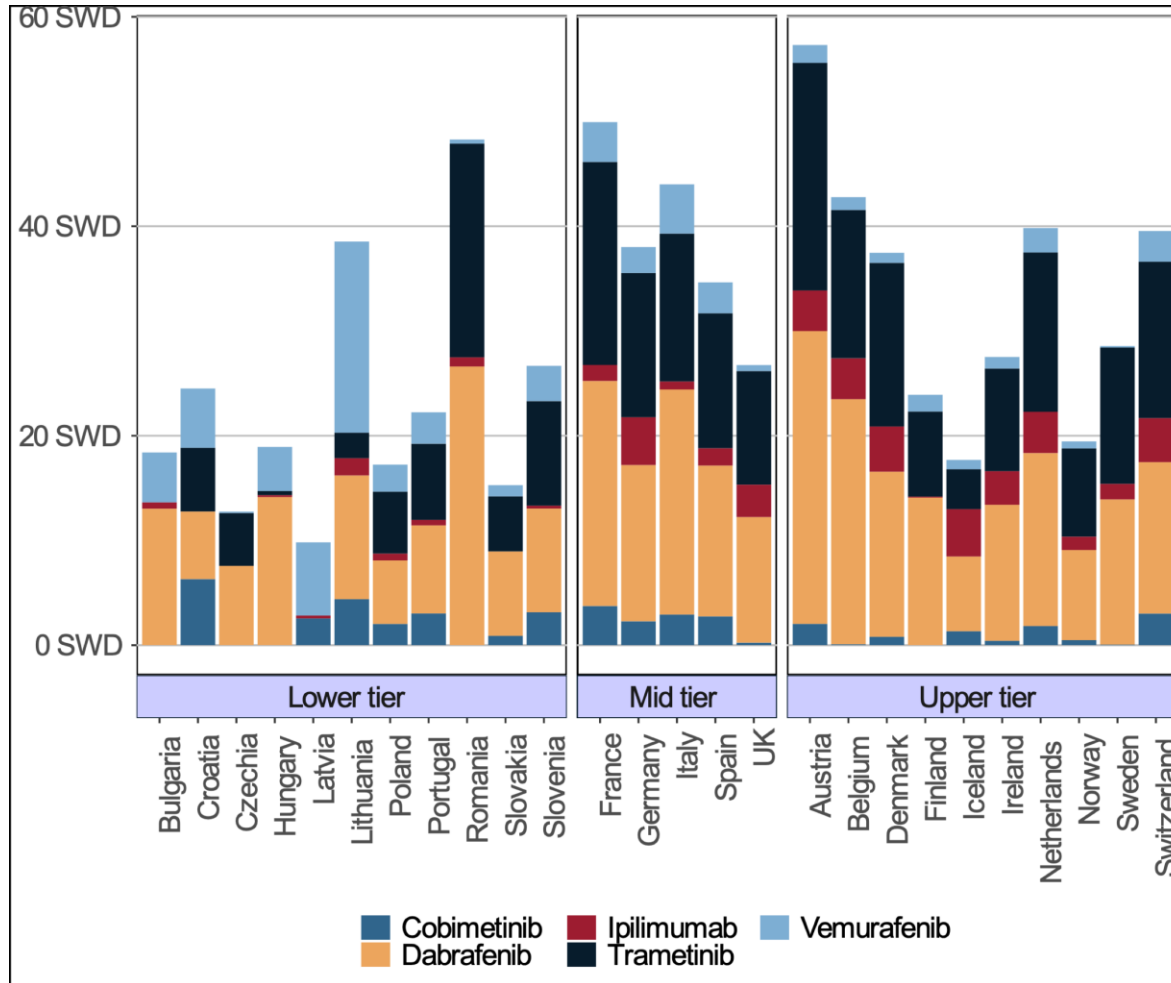
Slowest access in Italy but  
lowest uptake in Spain 2013–  
2016

Uptake of ipilimumab expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from malignant melanoma

Source: IQVIA

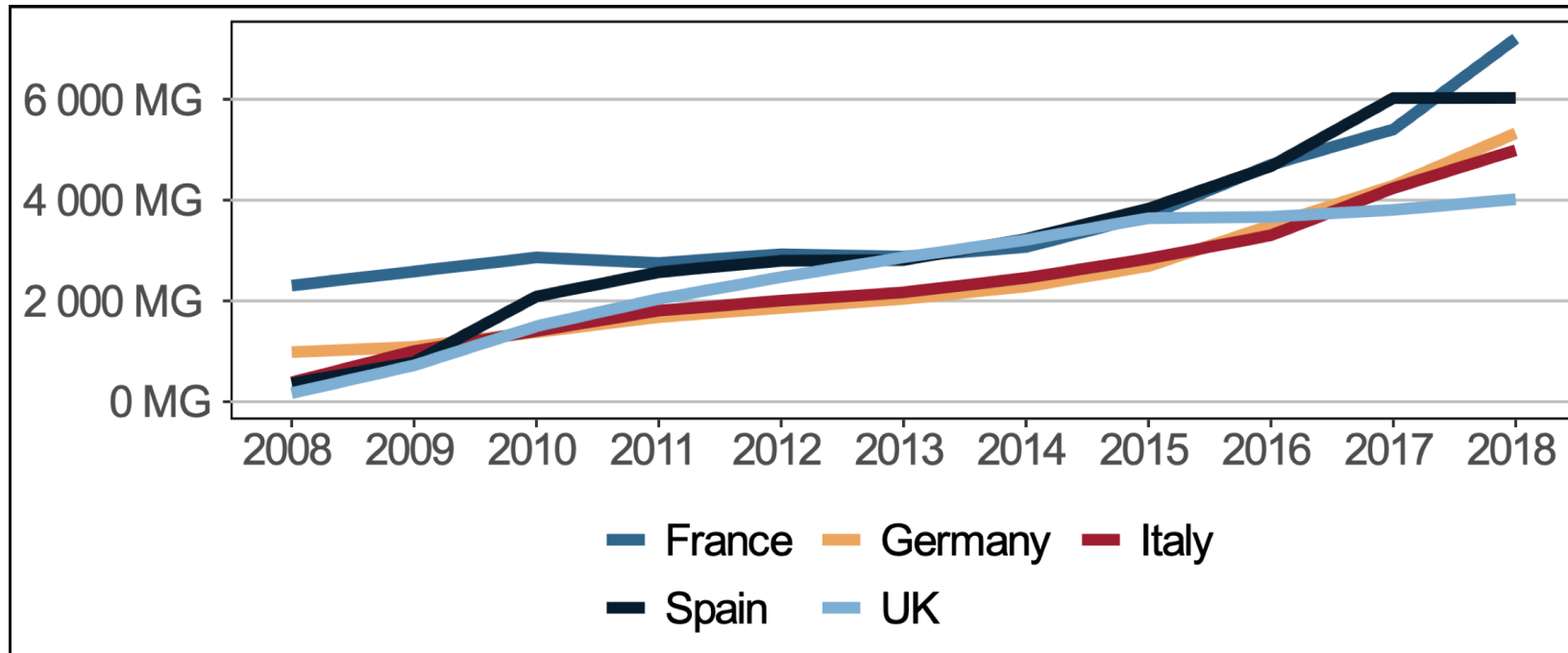
# Access - malignant melanoma medicines (volume)



Large differences in uptake even within country groups

Some poorer countries have as high uptake as some of the wealthiest countries

# Access - multiple myeloma medicines (volume)



Lenalidomide

EMA approval: June 2007

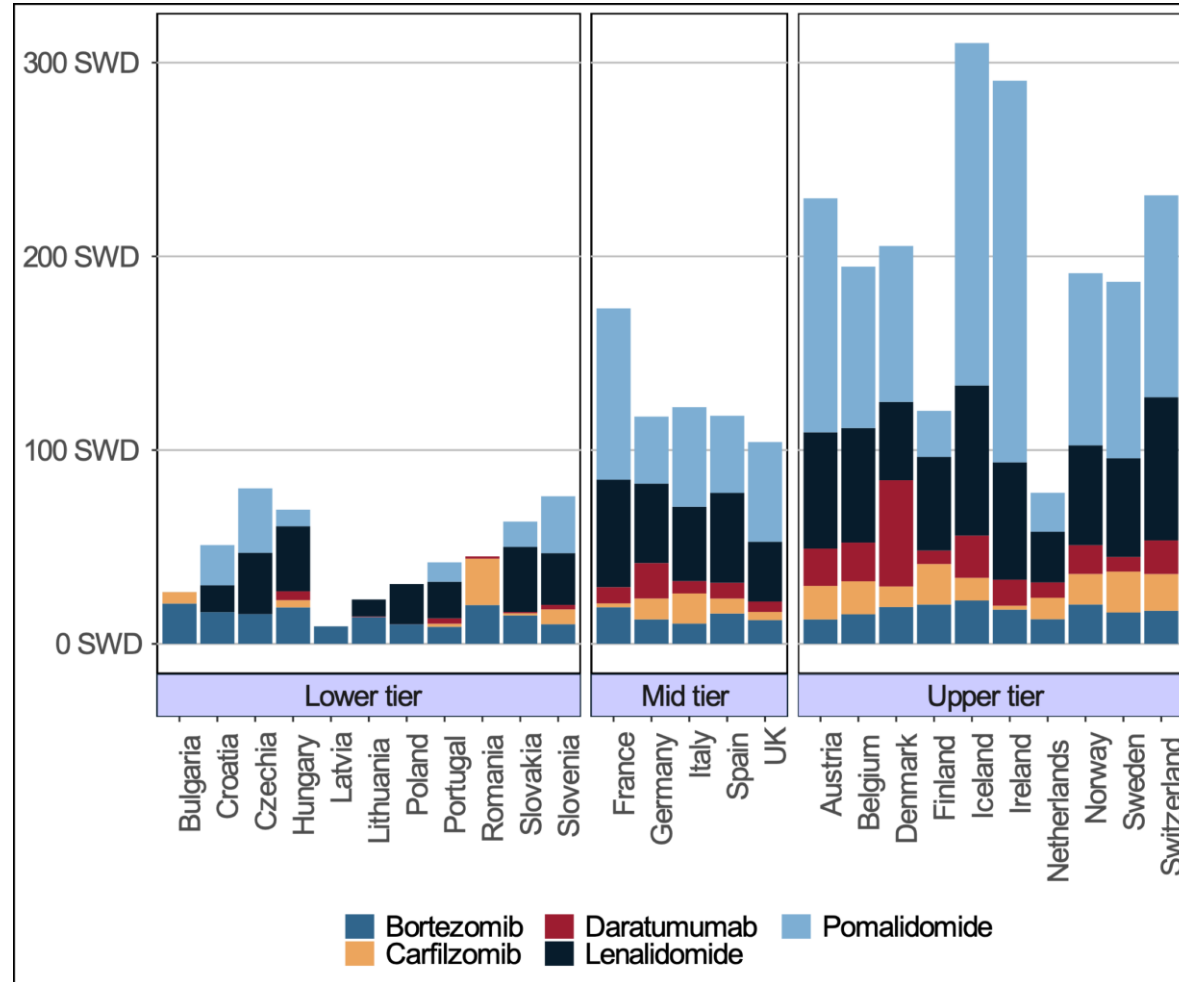
Fairly similar uptake in all countries, but levelling off in the UK in recent years

Uptake of lenalidomide expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from multiple myeloma

Source: IQVIA

# Access - multiple myeloma medicines (volume)

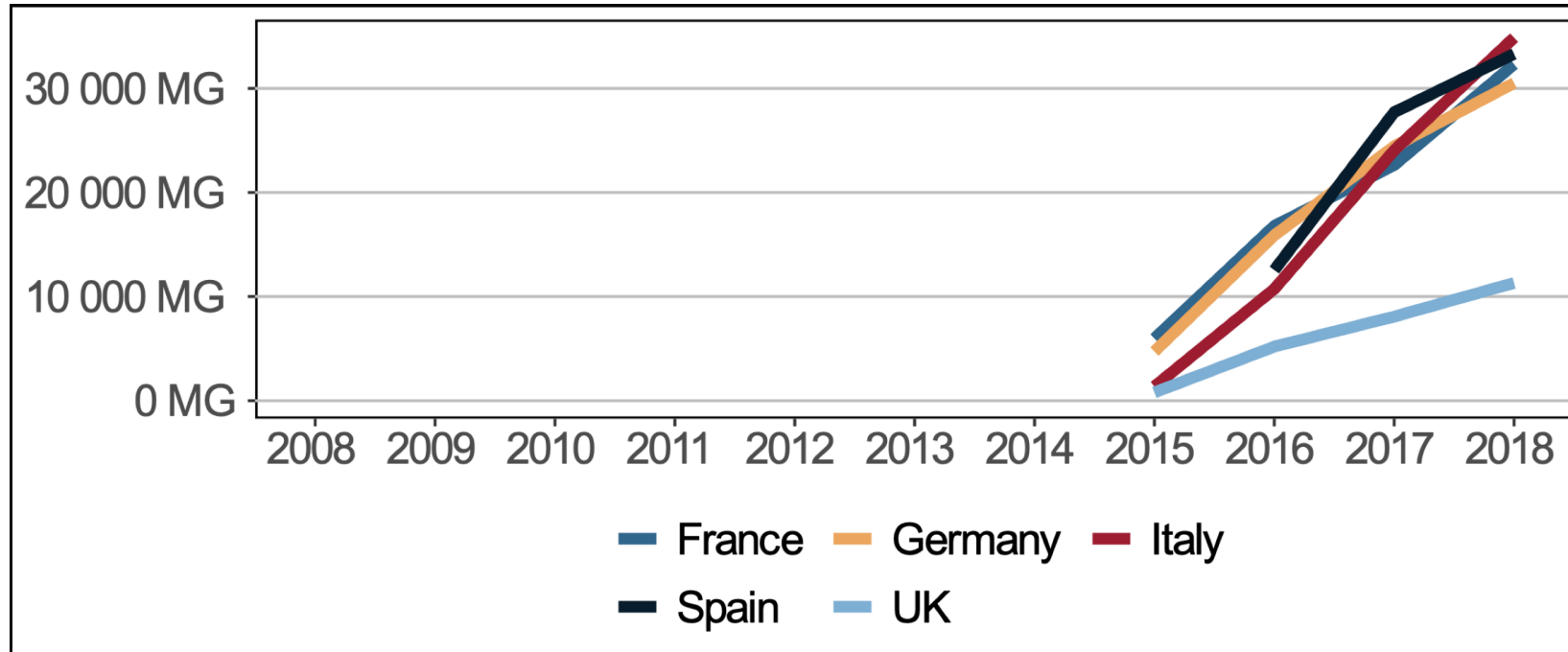


Highest uptake in the wealthiest countries

Fairly similar uptake among the Big5 countries

Very low uptake in all poorer countries

# Access - ovarian cancer medicines (volume)



Olaparib

EMA approval: December 2014

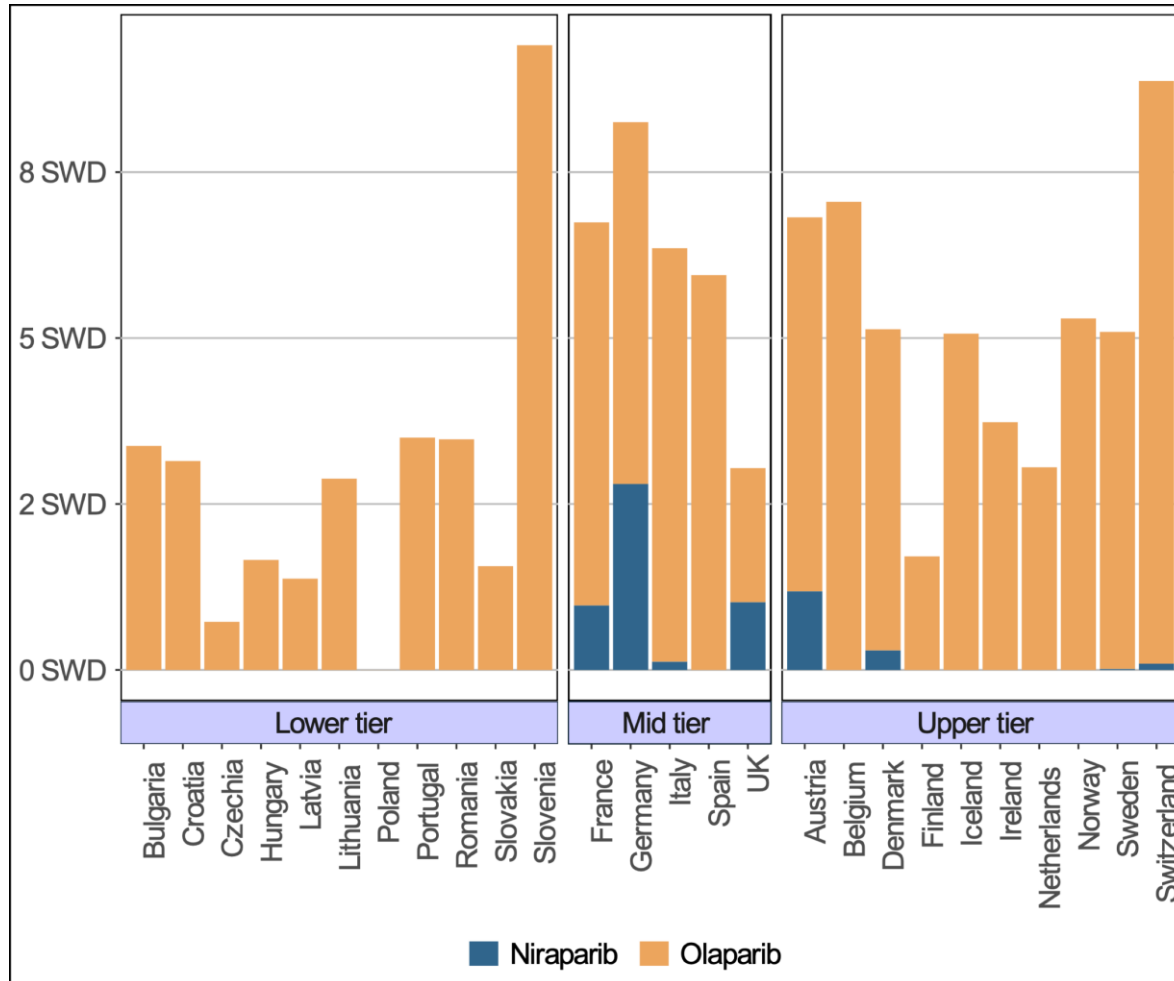
Slowest access in Spain, but  
lowest uptake in the UK

Uptake of olaparib expressed as sales in mg per case

Notes: mg = milligram; case = number of mortality cases from ovarian cancer

Source: IQVIA

# Access - ovarian cancer medicines (volume)

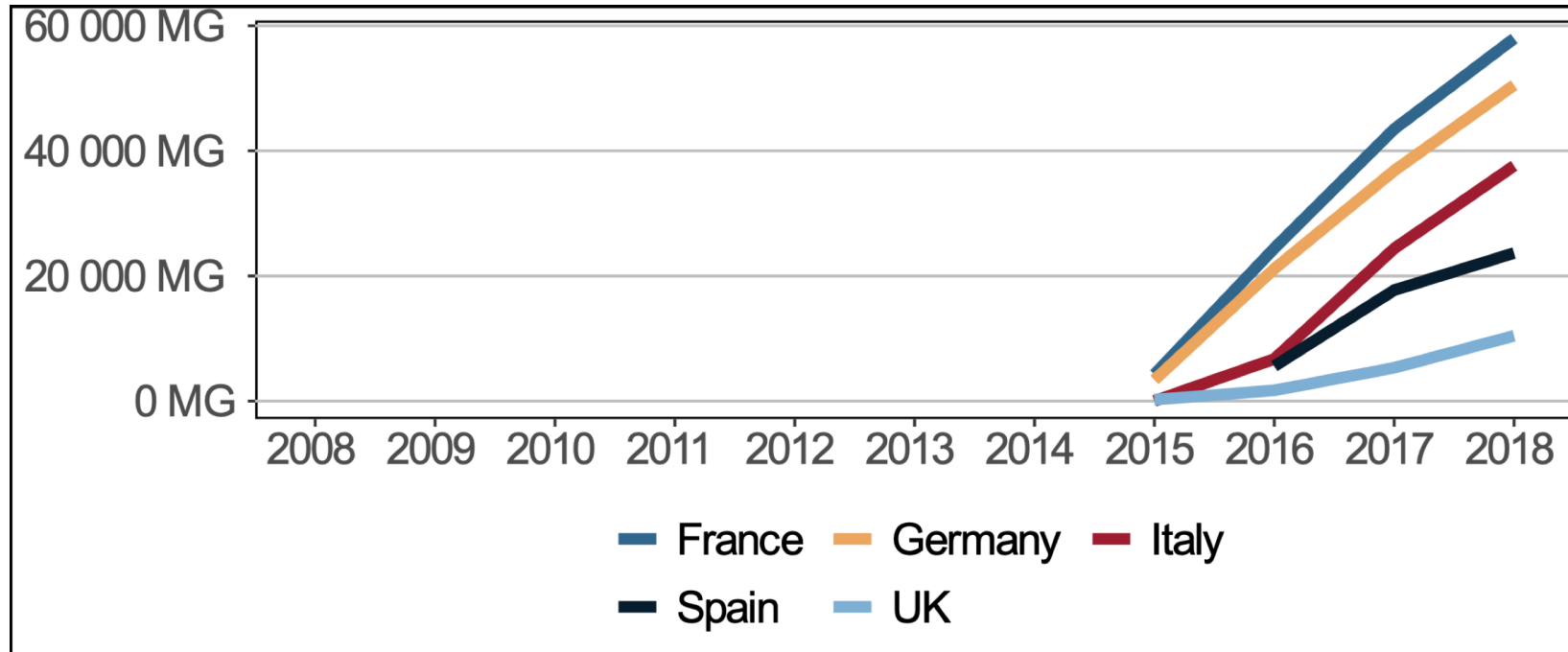


Large differences in uptake even within country groups

Some poorer countries have as high uptake as some of the wealthiest countries



# Access - immunotherapy medicines (volume)



Nivolumab

EMA approval: June 2015

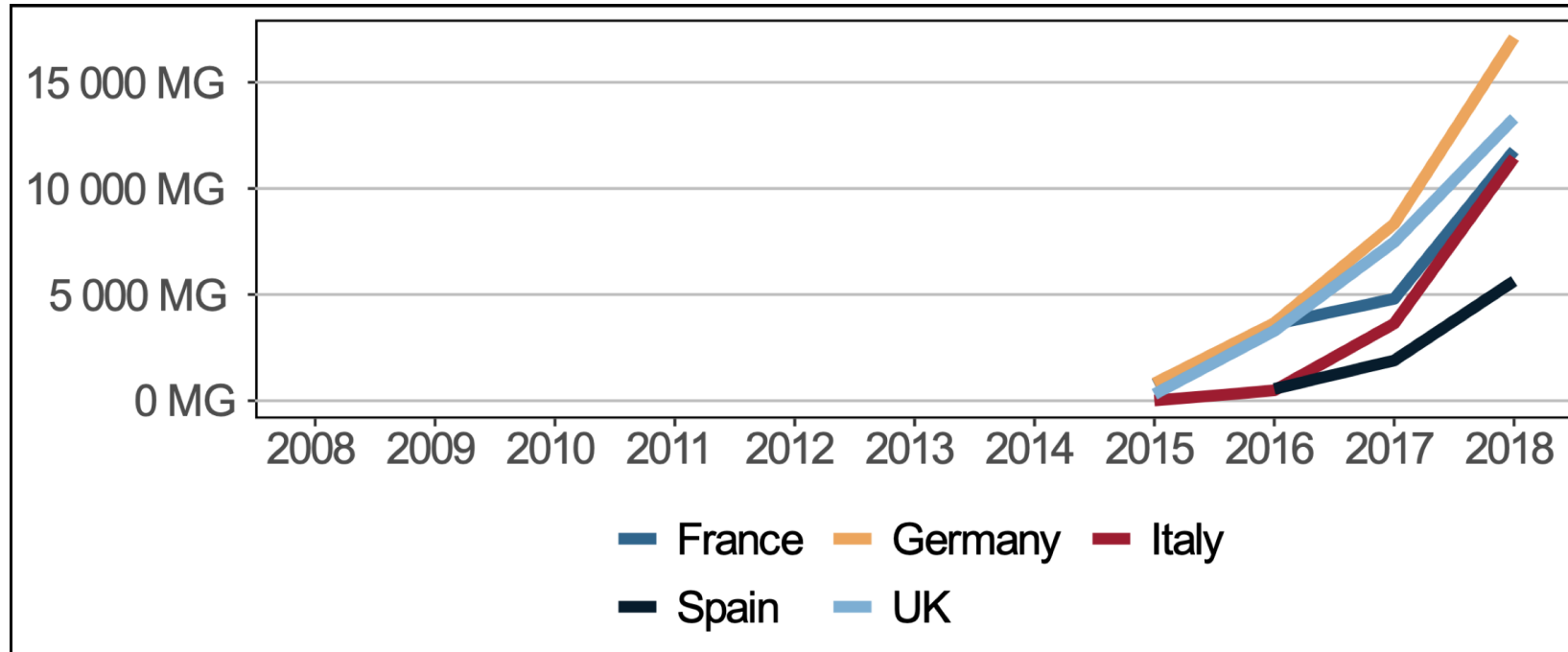
Slowest access in Spain, but  
lowest uptake in the UK

Uptake of nivolumab expressed as sales in mg per 100,000 inhabitants

Notes: mg = milligram

Source: IQVIA

# Access - immunotherapy medicines (volume)



Pembrolizumab

EMA approval: July 2015

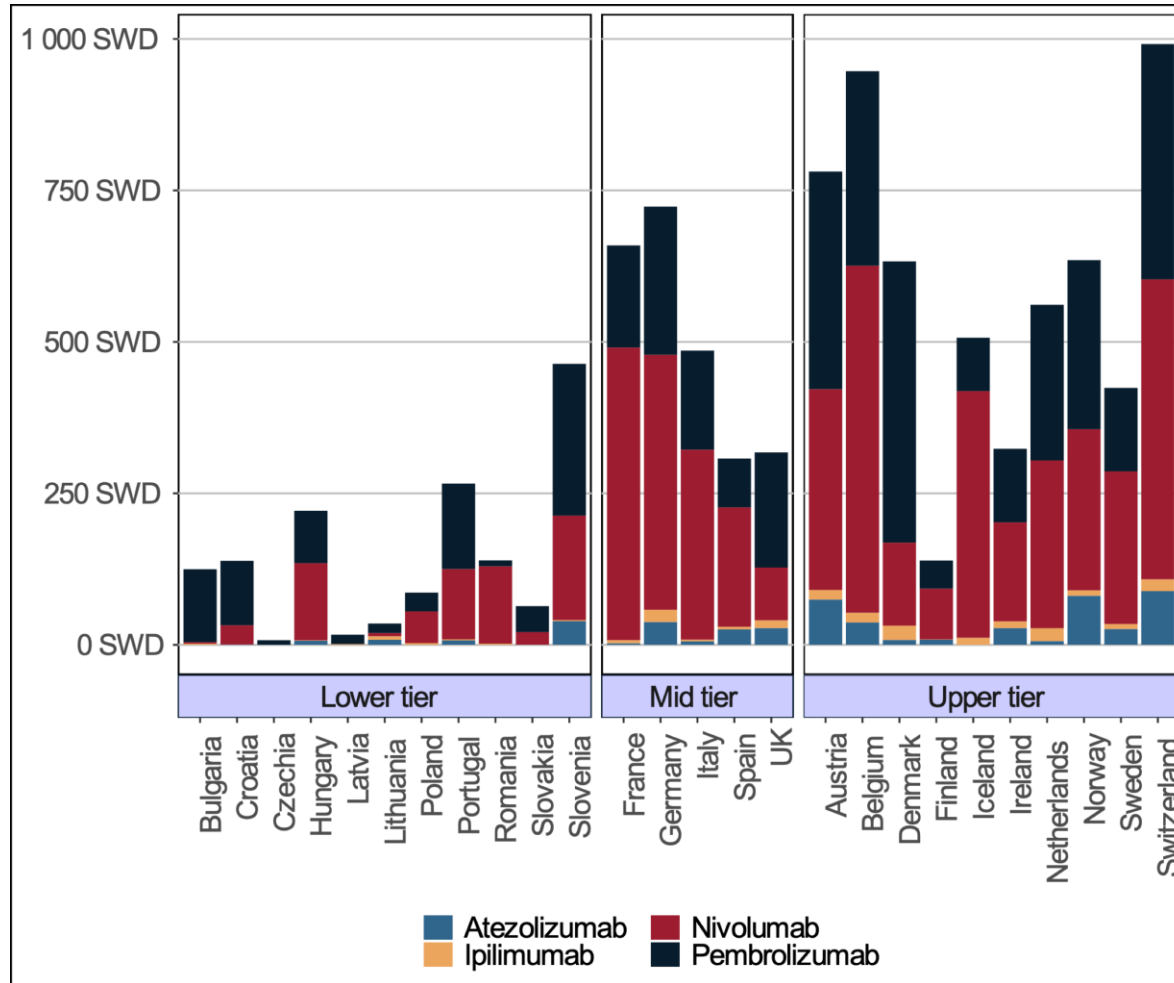
Slowest access and lowest uptake in Spain

Uptake of pembrolizumab expressed as sales in mg per 100,000 inhabitants

Notes: mg = milligram

Source: IQVIA

# Access - immunotherapy medicines (volume)



Large differences in uptake even within country groups

Very low uptake in almost all poorer countries

# Summary – patient access to medicines

- Much greater access to new cancer medicines in wealthier than in poorer countries
  - Irrespective of measuring access in terms of value or volume
  - No noticeable convergence over time (see previous Comparator reports)
- Largest country differences in uptake (in volume) in 2018 in
  - Immuno-oncology medicines
  - Multiple myeloma
  - Prostate cancer
- Large differences in access even between “similar” countries
  - E.g. slow access in Spain compared to France
  - E.g. low uptake in the UK compared to Germany and France

# Economic burden of cancer

Direct and indirect costs

What is driving the development over time?



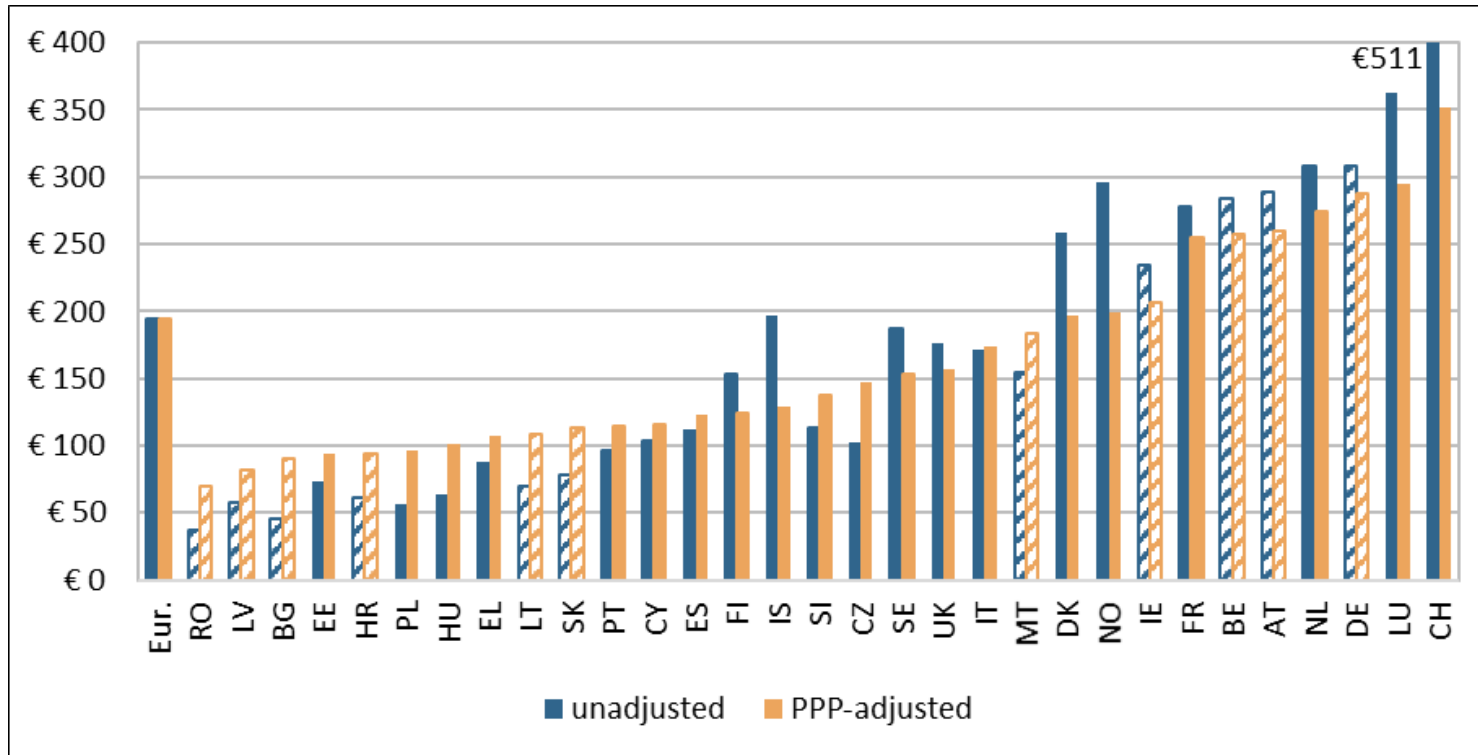
COMPARATOR REPORT ON CANCER  
IN EUROPE 2019  
-DISEASE BURDEN, COSTS AND ACCESS  
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# Direct costs of cancer in 2018



Direct costs of cancer per capita (in €), 2018

Notes: Hatched bars indicate that the direct costs are estimated based on data from similar countries; see Appendix for methodology. The blue bar for CH is truncated - its true size is €511.

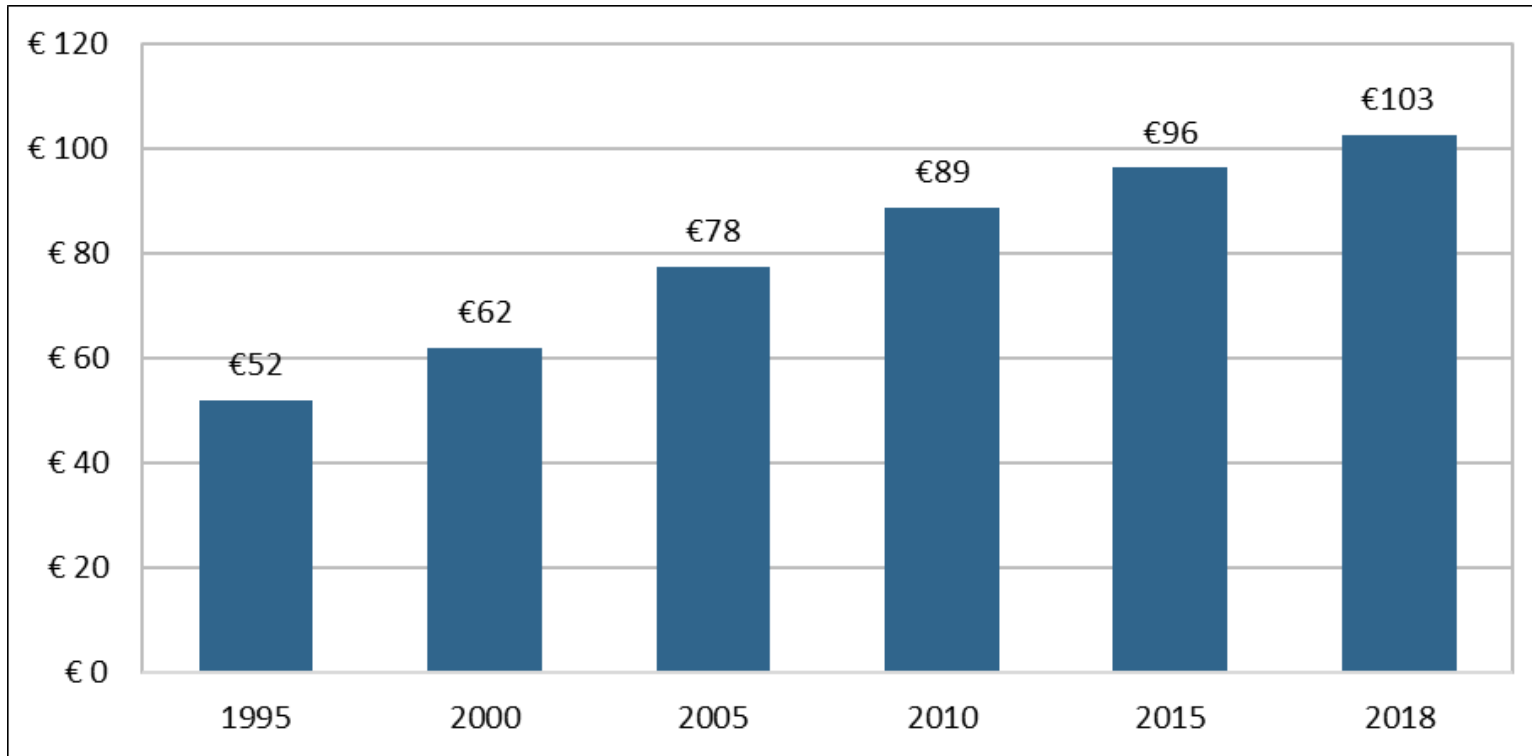
All countries spent between 4–7% of total health expenditure on cancer in 2018

Europe = €195 per capita

5-fold difference between lowest spender (€70, Romania) and highest spender (€352, Switzerland) if PPP-adjusted (if not, 14-fold difference!)

**Direct costs** = resources within the health care system (medical equipment, staff, medicines, etc.)

# Direct costs of cancer between 1995–2018



98% cost increase in Europe between 1995–2018  
(86% cost increase in per capita)

Simultaneous developments:

- 50% increase in cancer incidence
- 118 EMA-approved medicines

Direct costs of cancer in Europe (in billion €, 2018 prices and exchange rates), 1995–2018

Notes: The 1995 estimates could only be adjusted for country-specific inflation between 1996 and 2018 due to lack of data.

# Trend 1: Direct costs are increasing, but mostly in line with total health expenditure

Cancer-specific share (in %) of total health expenditure in selected countries

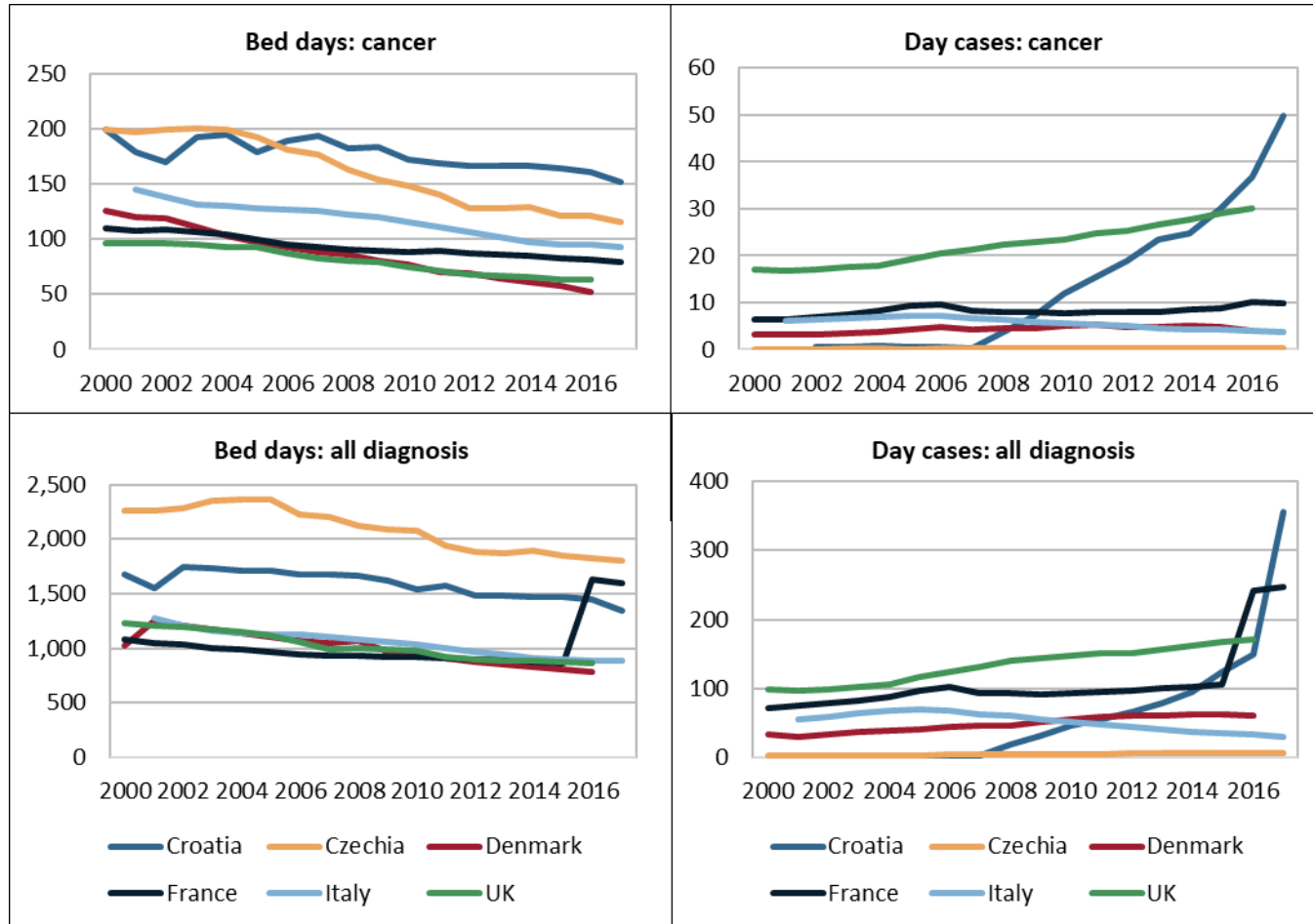
	2002	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17
Czechia								5.7		7.0						
Finland			4.1										4.0			
France												6.2	6.5	6.7	6.8	7.1
Germany	6.3		6.9		7.2		7.1							6.8		
Netherlands		4.7		4.8		5.5				6.2				6.9		
Norway										4.5	4.2	4.3	4.2			
Poland								6.7	6.9	7.0						
UK		4.9	5.1	5.2	5.0	5.1	5.1	5.3	5.0	4.9	5.0					

Mostly stable share of health spending on cancer in countries with available data

Low spending in comparison with the disease burden of cancer (26% of deaths and 20% of DALYs)



## Trend 2: Shift from inpatient care to ambulatory care



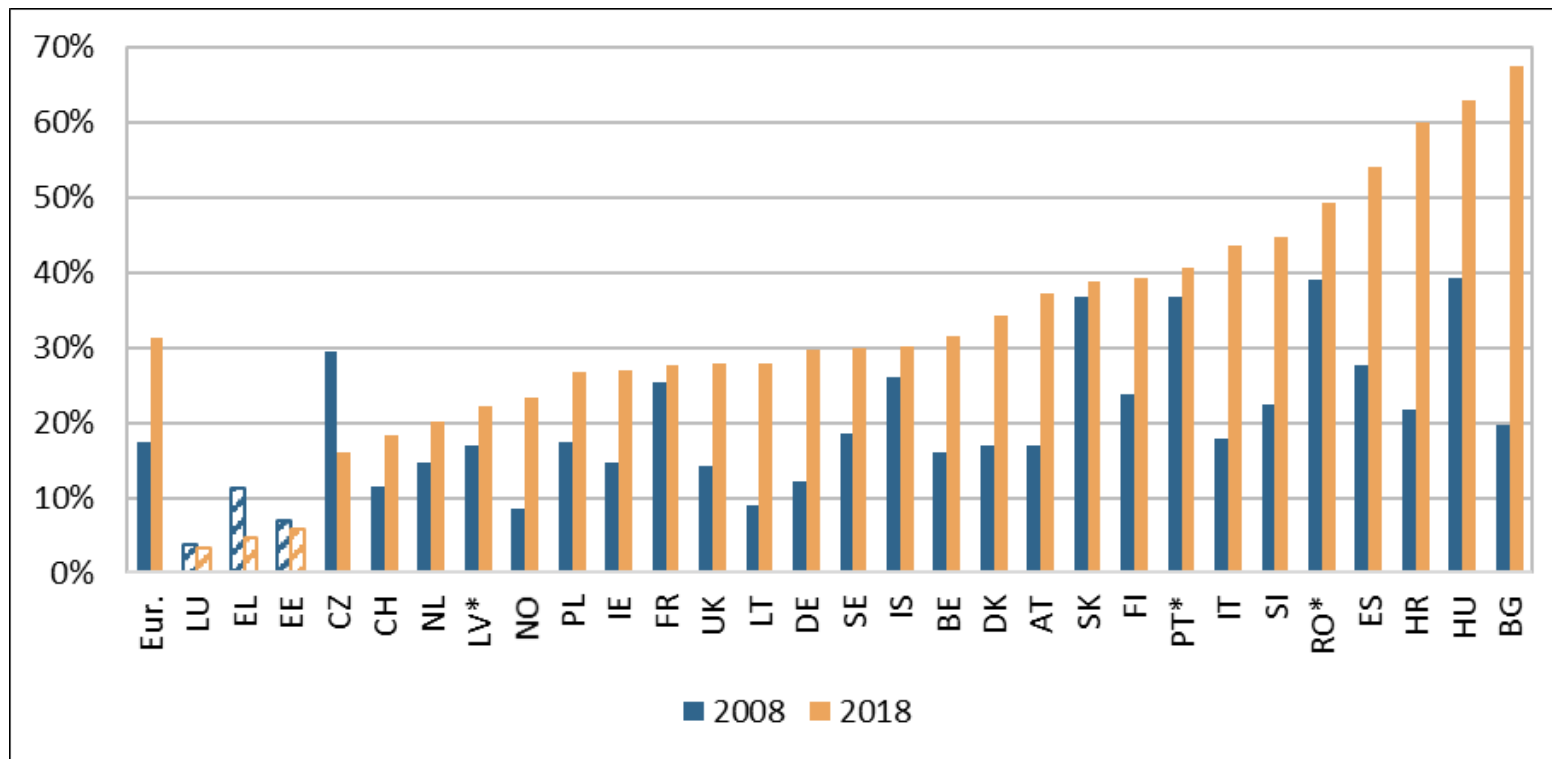
Trend toward fewer bed days is stronger in cancer care than overall

Trend toward more day cases (i.e. admitted & discharged on the same day)

Probably most patients are shifted to ambulatory care or can receive (oral) treatment at home

Bed days (left figures) and day cases (right figures) spent in hospitals per 1,000 inhabitants, 2000–2017

# Trend 3: Cancer medicines account for a growing share of direct costs



Share of cancer medicines increased from 17% to 31% in Europe

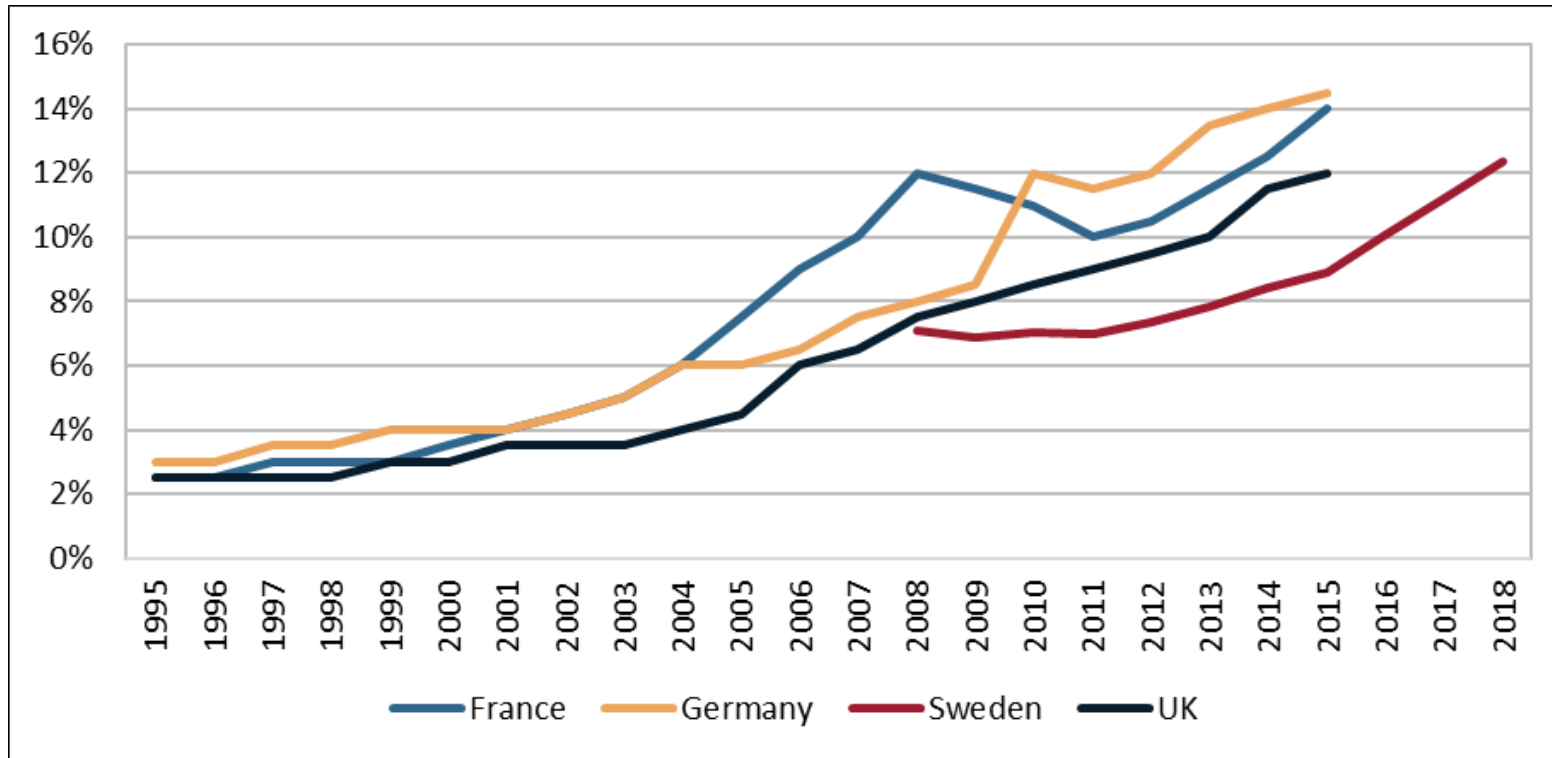
Poorer countries spend a larger share of direct costs spent on cancer medicines

Wealthiest countries spend the lowest share of direct costs on cancer medicines

Share of the cost of cancer medicines on the direct costs of cancer, 2008 & 2018

Notes: Hatched bars indicate that data for cancer medicines for EE, EL, and LU only comprise retail sales. \* The share in 2008 for PT is from 2010, for RO from 2009, and for LV from 2014.

# Cancer medicines and total pharmaceutical sales

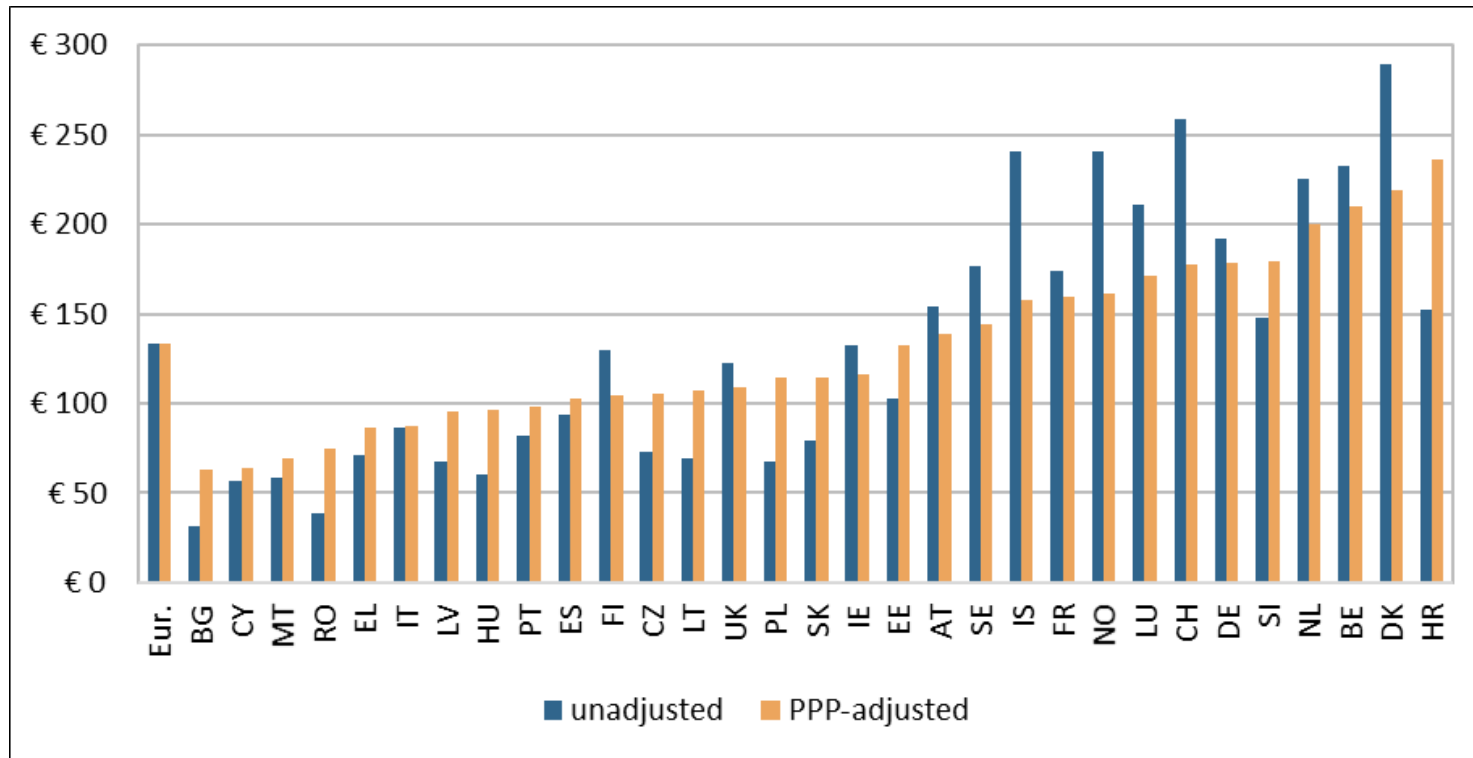


Cancer medicines account for a modest but growing share of total pharmaceutical sales

Share of cancer medicine expenditure on total pharmaceutical expenditure, 1995–2018

Source: Aitken et al (2017) and Swedish eHealth Agency

# Indirect costs of cancer in 2018



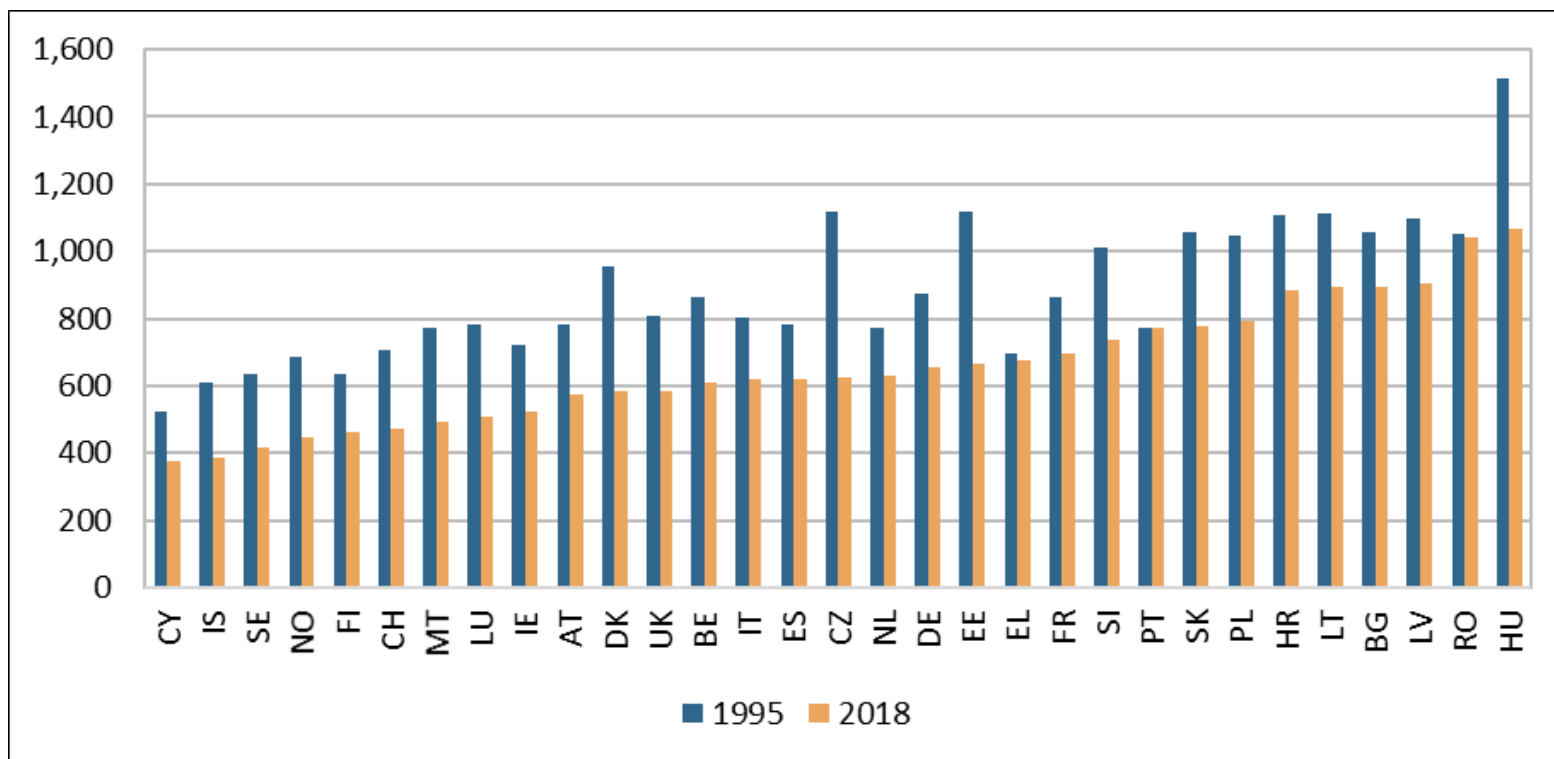
Europe = €133 per capita

Smaller country differences  
than for direct costs

**Indirect costs** = productivity loss  
from (1) premature mortality in  
working age, and (2) morbidity  
(sickness absence and permanent  
incapacity/disability) of people of  
working age

Indirect costs of cancer per capita (in €), 2018

# Trend: Reduction in mortality in patients of working age



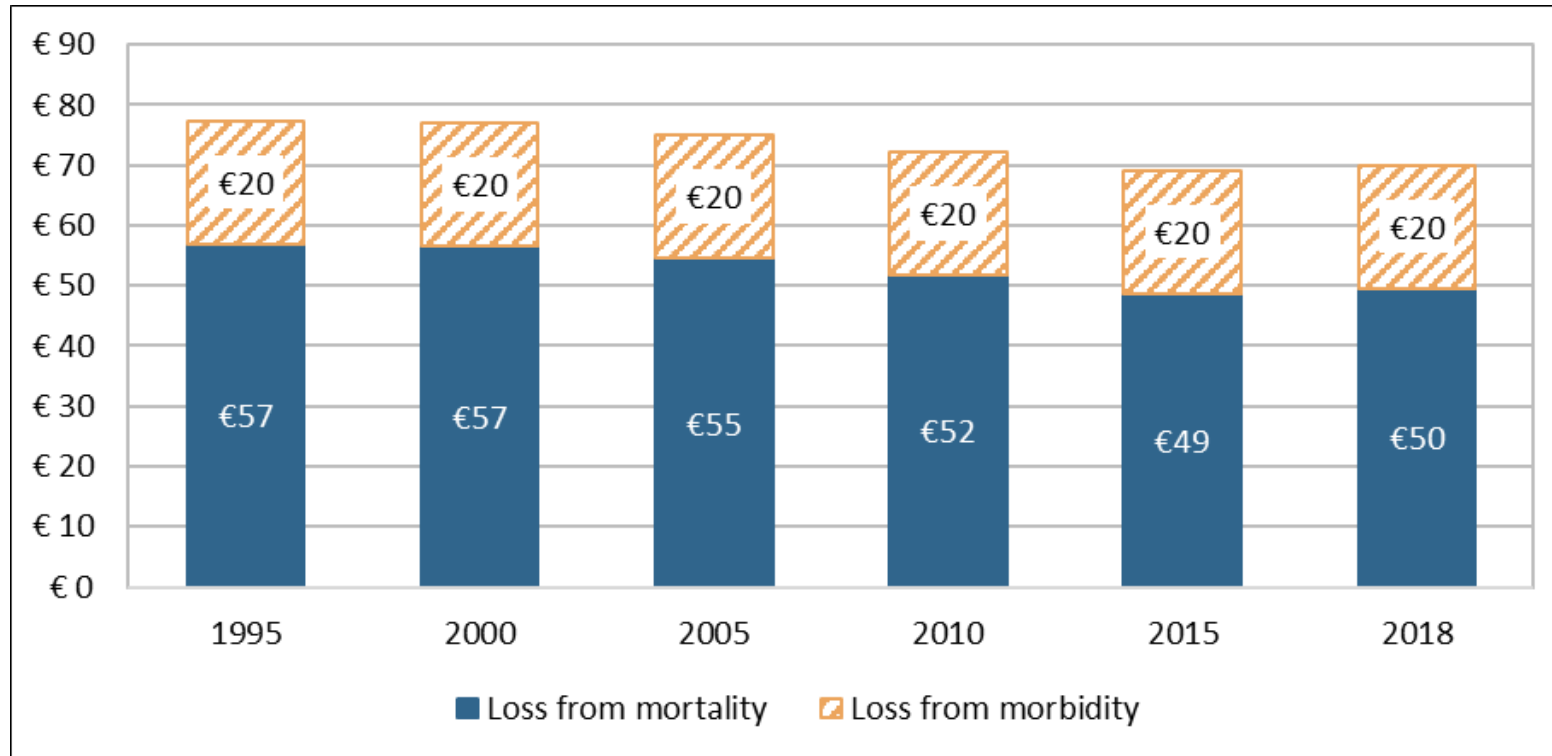
Increases in survival translate into a reduction in years of working life lost (PYWLL)

Reduction in Europe from 2.9 to 2.3 million years 1995–2018

Reductions in all countries (stable in EL, PT, RO)

Number of PYWLL due to cancer (per 100,000 inhabitants aged 15–64), 1995 & 2018

# Indirect costs of cancer between 1995–2018



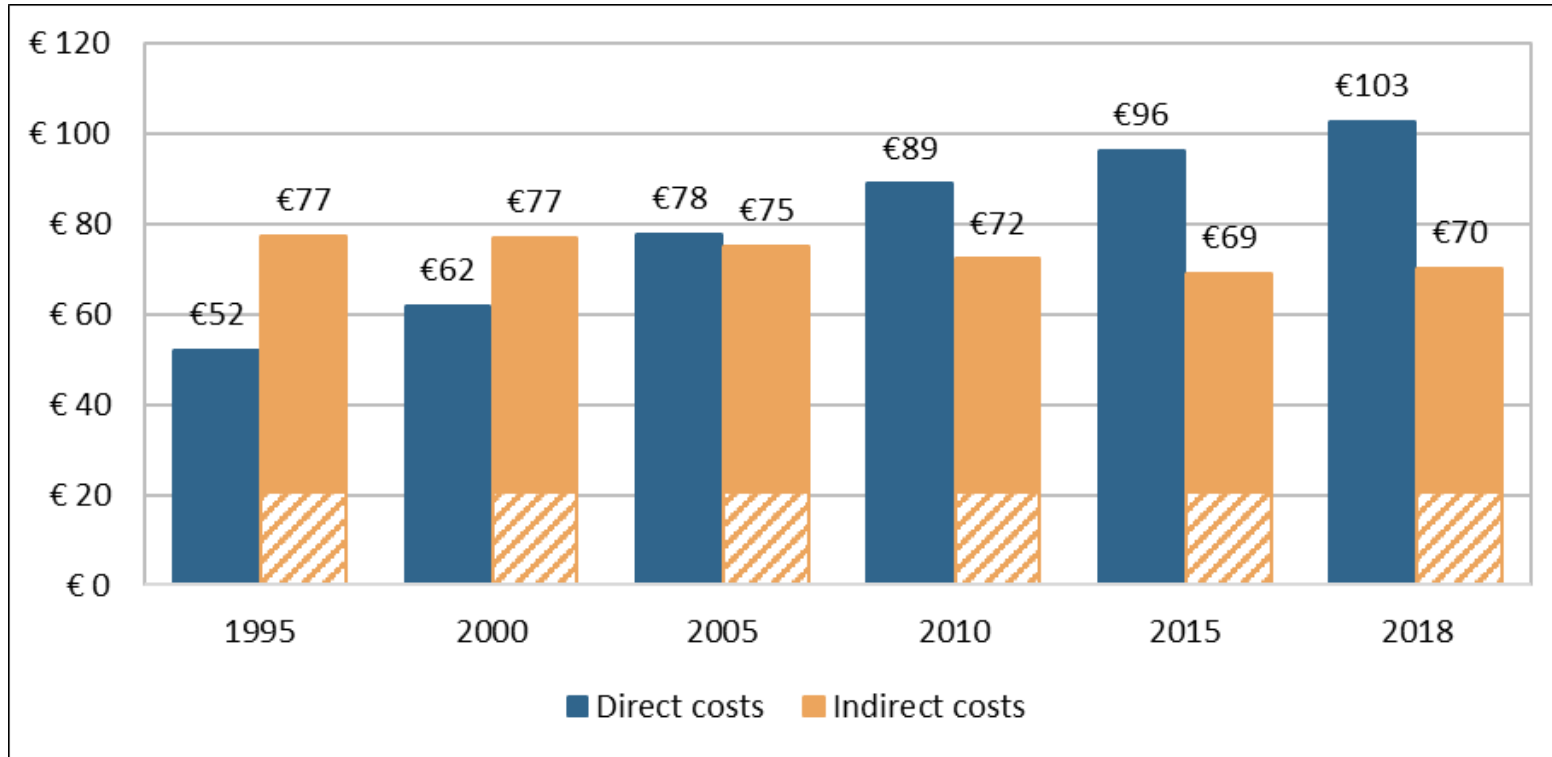
9% cost reduction from €77 to €70 billion in Europe between 1995–2018  
(15% cost reduction in per capita)

Simultaneous decrease in PYWLL was 24% in Europe

Indirect costs of cancer in Europe (in billion €; 2018 prices & exchange rate), 1995–2018

Notes: “Loss from mortality” and “Loss from morbidity” refer to productivity loss from premature mortality and morbidity, respectively. Hatched bars indicate crude and uncertain estimates.

# Total costs of cancer between 1995–2018



**Total costs in Europe increased**  
from €129 to €173 billion  
between 1995 and 2018

**Increase in direct costs**  
(typically by 60–150% in  
wealthier countries and  
>200% in poorer countries)

**Decrease in indirect costs**  
(typically by 15–30% in  
wealthier countries and 0–  
10% in poorer countries)

Total costs of cancer in Europe (in billion €; 2018 prices & exchange rates), 1995–2018

Notes: The hatched part of the indirect costs indicates uncertain estimates of the size of productivity loss from morbidity.

# Summary – economic burden of cancer

- Direct costs = health care spending on cancer
  - Increases over time due to increased overall health care spending and not necessarily due to more resources spent on cancer care
- Indirect costs = productivity loss
  - Reductions over time due to decreases in mortality of working-age people
- Persistent knowledge gaps in most European countries
  - Direct costs outside of hospital setting, i.e. social care services
  - Extent and development of informal care
  - Development of indirect costs linked to morbidity



# Policy measures for improved cancer care

Efficiency of cancer care spending and patient outcomes

Innovation and creation of value to patients



COMPARATOR REPORT ON CANCER  
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TO MEDICINES

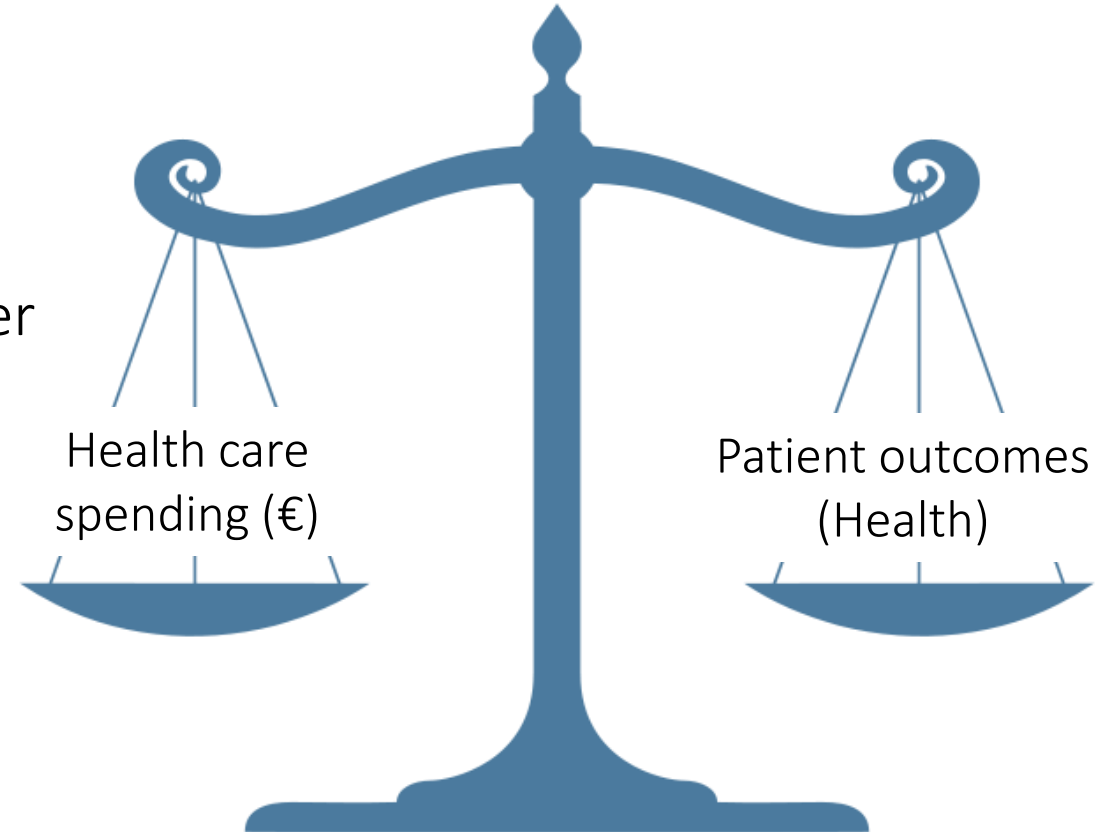


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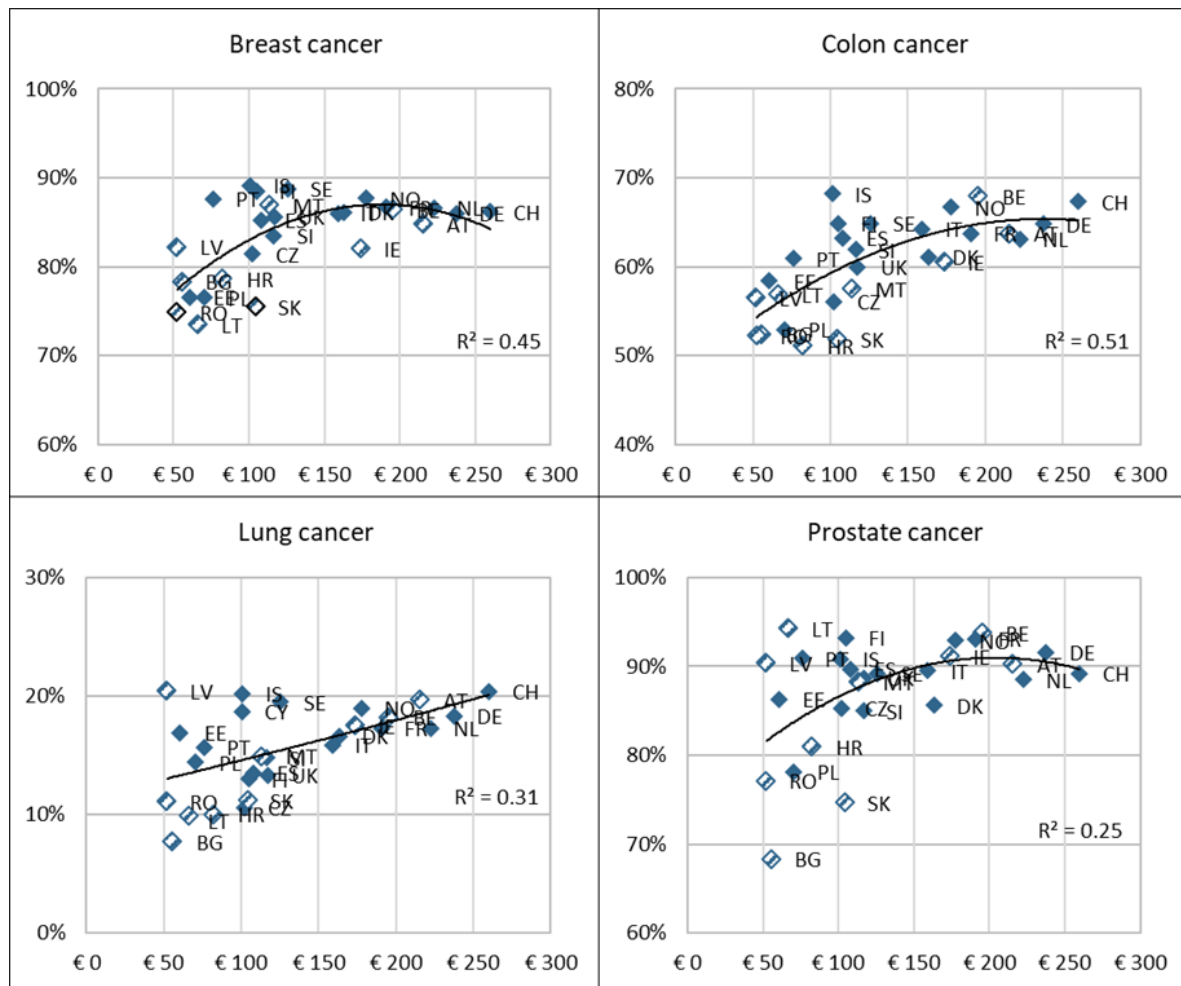
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# Efficiency of cancer care spending and patient outcomes

- Constrained resources and increasing demand for health care
- Costs from investing in different areas of cancer care need to be weighed against potential improvements in patient outcomes
- Use of scarce resources in a cost-effective and efficient way to ensure value-for-money for patients and taxpayers



# Efficiency of cancer care spending and patient outcomes



Upward sloping trend lines

→ indicate that adequate health spending on cancer is a prerequisite for achieving high survival rates

Great variation in health spending on cancer between countries that achieve similar survival rates

→ indicates opportunities to improve efficiency and outcomes

All countries should:

- Continue to invest in cancer care to achieve higher survival rates

Countries below the fitted lines should also:

- Prioritize adjusting their mix of health resource inputs and invest in areas where the greatest efficiency gains can be expected

# Tools for improving efficiency

- National Cancer Control Programme / Cancer Plans
  - Comprehensive (from prevention to palliative care)
  - Evidence-based measures
  - Financing plan
- Nationwide population-based cancer registry
  - Detailed level of diagnosis
  - All treatments given
- Disease-specific health accounts
  - Ideally within the System of Health Accounts (SHA) framework

# Measures for improving efficiency

- Cost-effective and evidence-based measures
- Primary prevention (Examples)
  - Tobacco control through tougher regulation
  - HPV vaccination programs for girls and boys
- Screening
  - 1<sup>st</sup> Colorectal cancer
  - 2<sup>nd</sup> Cervical cancer
  - 3<sup>rd</sup> Breast cancer
  - Still unclear: prostate cancer
  - So far not well-established: lung cancer

Relatively clear priority order in terms of cost-effectiveness of different screening programs

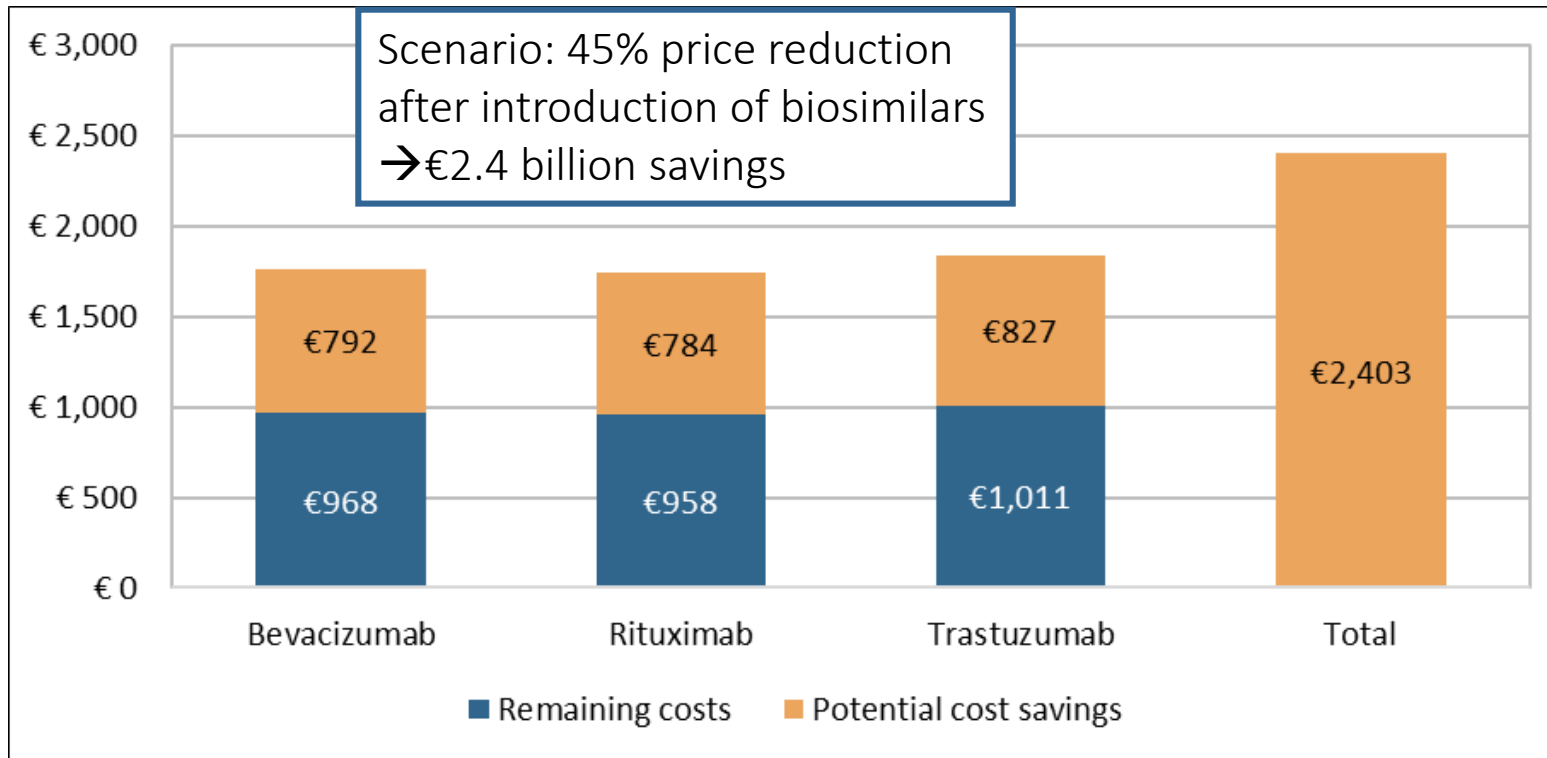
Actual implementation in most countries was:

1<sup>st</sup> Breast cancer  
2<sup>nd</sup> Cervical cancer  
3<sup>rd</sup> Colorectal cancer

# Cost effectiveness of cancer medicines

- Access to cancer medicines is important for improving patient outcomes
  - Personalized treatment might support efficient spending
  - Increasing number of medicines, used in combination and sequence, creates more alternative uses of resources and makes it more difficult to evaluate cost-effectiveness
- Societal perspective in health economic evaluations is important
  - Cost changes outside the health care system (formal social care, productivity loss, informal care) should not be neglected
- Trade-off for new medicines between early access and evidence on value to patients
  - Many medicines lack evidence of additional clinical benefits (such as OS) at EMA approval, which creates a demand for:
    - (1) Follow-up studies of patient outcomes in clinical practice (collection of RWD)
    - (2) Mechanisms for adjusting pricing and payments based on such studies (shared risk between payers & producers)
    - → Could lead to a faster and more equal uptake of innovative medicines that provide most value to patients and health care systems

# Use of biosimilars and generics



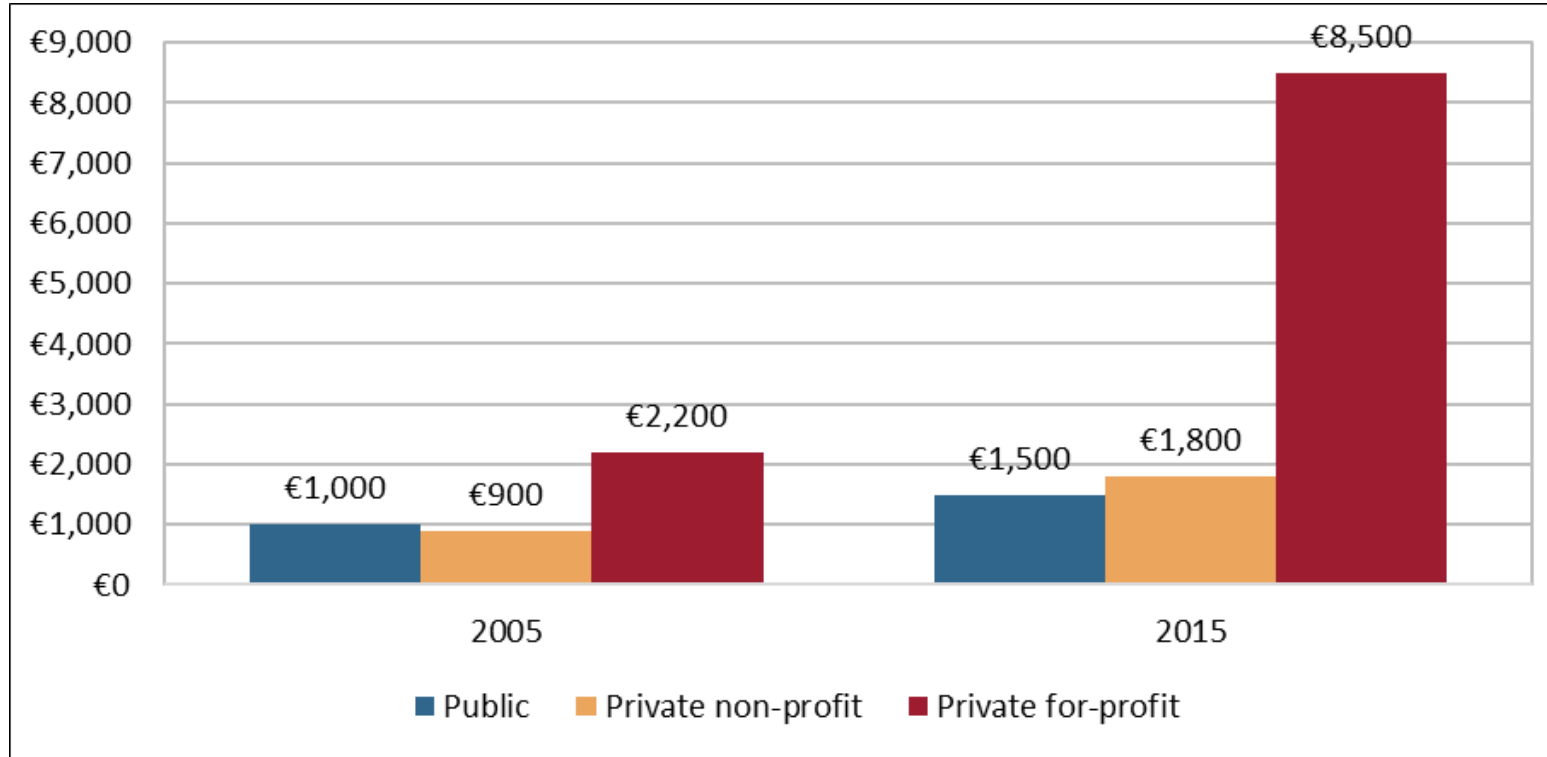
Today's innovative medicines will be tomorrow's biosimilars and generics

A broad use creates savings for the health care system and opportunities to invest into innovative and cost-effective medicines that previously seemed unaffordable for a large share of patients

Potential cost savings from biosimilars (in million €) in Europe (based on sales in 2016)

Source: IQVIA

# Cancer research



Funding of cancer research in the EU (in million €), 2005 & 2015 (or other available years)

Notes: Private for-profit funding in 2015 was estimated to lie between €8.5 and €13.5 billion.

Source: Jönsson et al (2019)

Cancer research is a prerequisite for future advances in cancer care

The pharmaceutical industry has become the dominant source of funding of cancer research and development of new products

The relation between public and industry spending on cancer research is nowadays about 1 to 6 in both Europe and the US



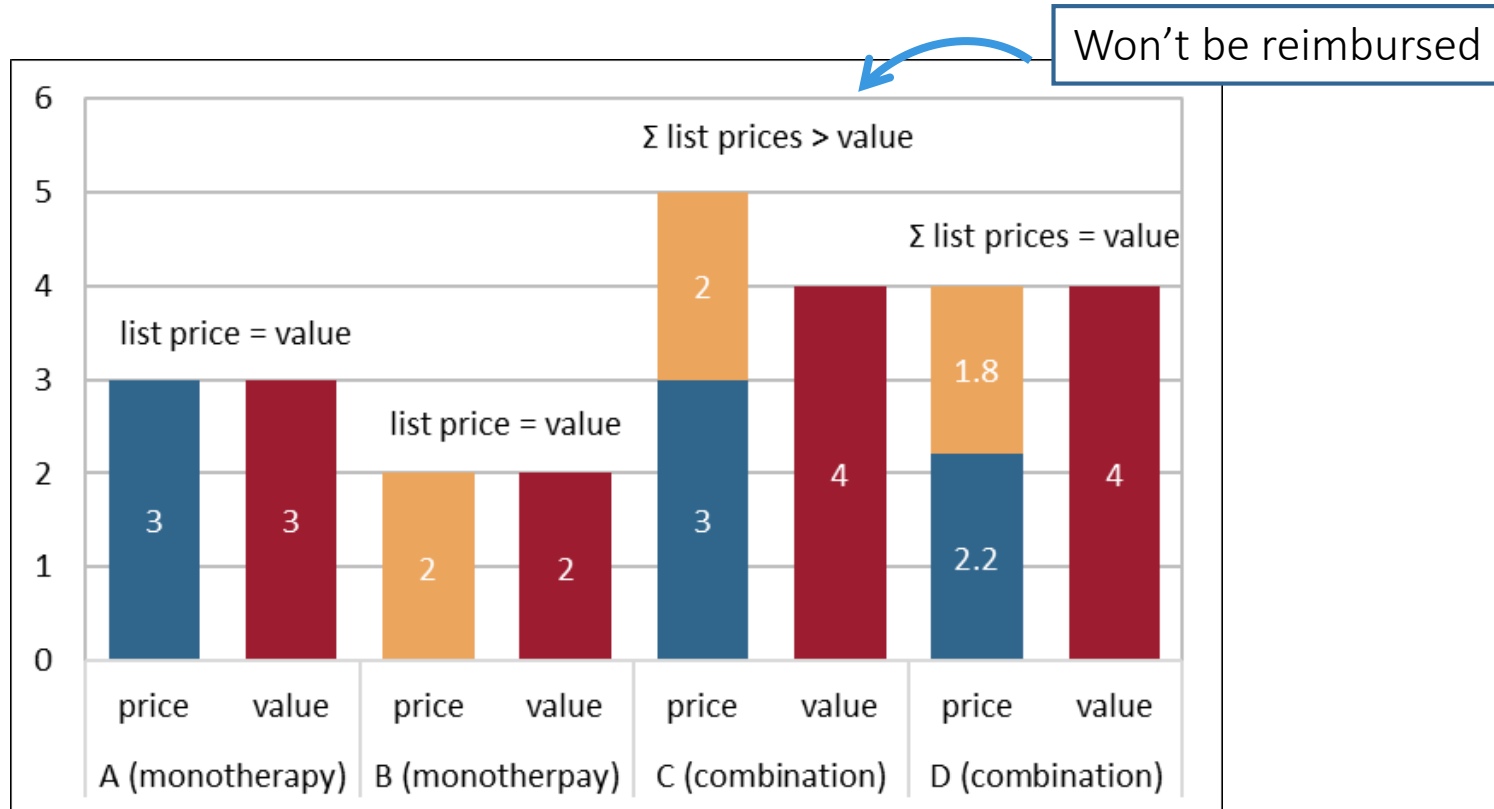
# Translating research into value for patients

- Incentivize innovation of valuable medicines through outcome-based payment models
- Encourage payers to implement innovative and timely pricing and reimbursement approaches
- Novel approaches to pricing, valuation, and payment of are needed for:
  - CAR T-cell therapies
  - Combination treatments
  - Multi-indication treatments

# CAR T-cell therapies

- Single treatment that might lead to cure in many patients
- Suggestion for adequate valuation and payment (Persson et al 2019)
  - Valuation:
    - Use of a risk elimination premium → acceptance of a higher cost-effectiveness threshold
    - Mixture cure models → decreases ICER
    - Higher discount rate → increases ICER
  - Payment model to break the affordability barrier:
    - Annuity payments → stretch out the costs over the period when value is realized
    - & outcome-based agreement → payments conditional on persistence of the health effect

# Combination treatments



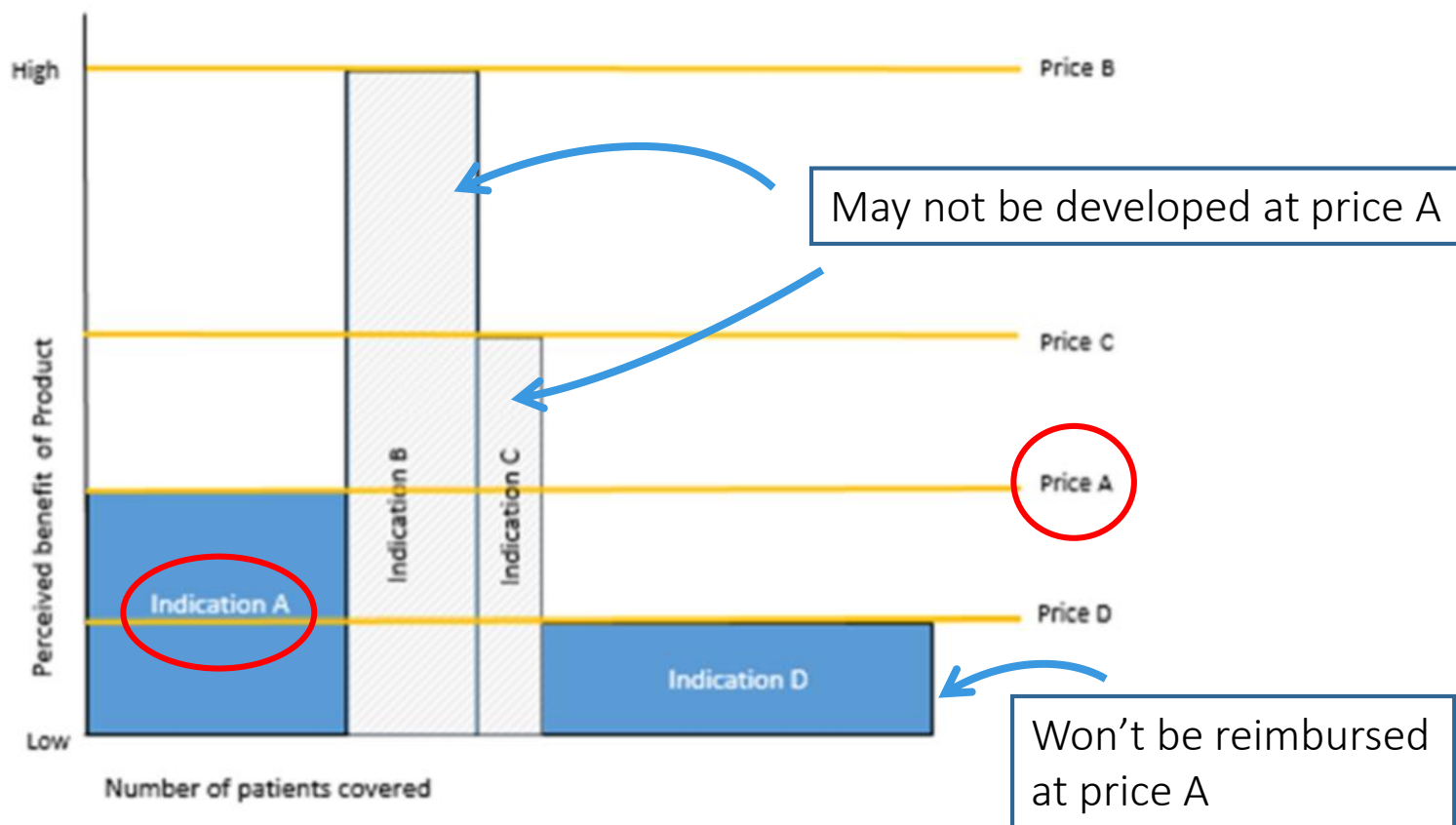
Value and price of monotherapy (with either medicine A or B) and combination therapy (C or D consisting of A and B)

Value of a combination is often less than the sum of the value of each component as a monotherapy

How should the combination's value be attributed to the different components?

- Unsatisfactory solution 1: Simple rebates on list prices of all components
- Unsatisfactory solution 2: Payer sets price for combination unilaterally and each component receives the same share

# Multi-indication treatments



Increasing number of cancer medicines approved in multiple indications

Product-based pricing = one price in all indications, irrespective of value

Indication-based pricing (IBP) = different prices in different indications in relation to the provided value

Key hurdle for IBP: Ability to track usage by indication

Source: Adapted from Claxton 2007, Hebborn 2014<sup>26,7</sup>

Source: CRA Pricing by Indication report, March 2015

The full Comparator report is available at:

<https://ihe.se/en/publicering/comparator-report-on-cancer-in-europe-2019/>

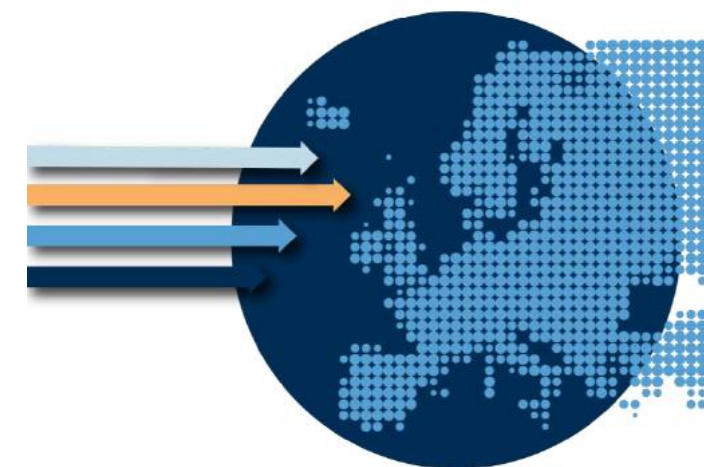
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Hofmarcher, T., Lindgren, P., Wilking, N., Jönsson, B. (2020) The cost of cancer in Europe 2018. European Journal of Cancer. (forthcoming).

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