Targeting the Affluent: Differential Access to Targeted Therapies in China

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Introduction: Conquering Complexity, at a Price

Humanity's battle against cancer has been waged for a very long time, but our strategy only truly shifted away from a purely surgical approach to a combination of surgery, radiation and systemic drug treatment throughout the course of the twentieth century. The second half of the 1900s was a period of profound change and shifting tactics on ever-moving battlefronts. However, those changes pale in comparison to the radical transformation that took place in the first two decades of the new millennium: the war is now being fought at a molecular level, harnessing the insights we have gained into the complexity of our enemy[1], finally giving us a glimpse of a future in which we will be conquering our foe by exploiting the precise genetic changes that drive its cancerous nature[2].

This revolution, however, is coming at a price, and that should be taken quite literally. This new molecular battlefront isn't just complex; it is also incredibly hungry for money[3]. This has led, and is continuing to lead, to healthcare costs that are in danger of spiralling out of control, causing healthcare systems to buckle under the ever-rising pressure. When considering this topic, it is worth highlighting that there is another, more literal sense in which the war against cancer is being fought on multiple fronts: different countries around the world have adopted the new tactics and tools at increasingly varying speeds and with markedly different levels of success. This, ultimately, comes down to the fact that affordability of novel drug treatments for an individual patient is intrinsically linked to the specific socio-demographic circumstances of that patient, the most significant of which is arguably the patient's country of residence and its associated national healthcare system.

In particular, there is substantial variability between different countries' ability and approach to ensuring equal access to the most effective – and often most expensive – drug treatments for all their citizens diagnosed with cancer. Some countries have a central philosophy, entrenched within their healthcare systems, of ensuring all patients can receive appropriate and approved drugs regardless of their income levels - although this model of universal reimbursement cover is becoming increasingly difficult to support due to the strain on governments' budgets. Other countries take an approach that relies on a combination of central and regional insurance to cover part of the costs, with the remainder of the burden falling onto the patients' shoulders, leading to a significant proportion of the population simply not being able to afford the more expensive therapies.

One such country belonging to the latter category is China, and while conditions have been improving thanks to the efforts from its government to push for better access to expensive medicines (see closing section), this paper will illustrate how disparities in income levels continue to drive far-reaching differences in the way poorer and richer Chinese with cancer are being treated for their disease. Importantly, it will also highlight how those differences in access to treatment ultimately lead to different outcomes for poorer patients.

The Chinese Healthcare System: A Tale of Many Cities

China has a complex healthcare reimbursement system. The National Drug Reimbursement List (NDRL) consists of two categories, known as Class A and Class B. Generally speaking, Class A drugs are cheaper than Class B. Whereas the list for Class A is consistent across China, the list for Class B (the more expensive drugs) varies from region to region. Regional governments can make some adjustments to the Class B drug lists. In other words, certain expensive drugs may be on the NDRL list in certain provinces/cities, but not in others.

In addition, the NDRL is only applicable to people who either have Health Insurance for Urban Employees (HIUE) or Health Insurance for Urban Residents (HIUR). The NRCMS list (New Rural Cooperative Medical Scheme) exists alongside the NDRL, but is considerably more limited in terms of the number of reimbursed drugs. In some cases, drugs may be reimbursed by the NRCMS, but not by the NDRL. The Chinese government is trying to integrate the various insurance systems, and some progress has been made in several cities; however, the fact remains that reimbursement coverage in China is far from universal, and can vary widely from province to province.

The positive news, from an access to care perspective, is that the total insurance coverage in China increased from below 15% to above 95% in the period of 2001-2011[4], a remarkable transformation in national health insurance coverage. However, even those patients who are covered by one of the basic social health insurance schemes and are prescribed a drug that's on the appropriate list in their city, still end up having to pay a significant proportion of the drug cost out of pocket, as the insurance schemes typically only cover a portion of the total cost. In 2011, for the 1.31 billion people covered by the China Health Insurance System, out-of-pocket payments accounted for 73.6% of the total cost of treatment[5].

As discussed, the healthcare market in China is a heterogeneous one, with significant regional differences. For the purposes of this paper, we will focus on 17 of the top cities in the country[6], three of which are officially classified as Tier I, with the remainder falling into Tier II. It is worth noting here that there are a great many cities in China that fall outside of these two tiers; additionally, there are vast rural regions. The examples that will be shown in this paper – demonstrating the differences in access between and within Tier I and Tier II cities – therefore really only scratch the surface of just how heterogeneous the market truly is.

The data that makes up the bulk of this paper is drawn primarily from the China Oncology Monitor, a bi-annual study that collects Real World Evidence data from Chinese cancer-treating physicians in the aforementioned 17 cities. Care should therefore be taken to extrapolate these trends to the full universe of cancer patients in the whole country, and the conclusions drawn should be considered within the context of these Tier I and major Tier II cities.

The Armamentarium's Cost: Different Classes, Different Price Tags

Before considering the specifics of their uptake in China, it is worth reminding ourselves of the different classes of systemic anti-cancer drug therapy that physicians have at their disposal. At the most basic level, a distinction can be made between non-targeted drug therapies and targeted drugs. The former class consists largely of cytotoxic chemotherapies, whereas the latter can be subdivided by their mechanism of action (e.g. tyrosine kinase inhibitors versus mTOR inhibitors), or the type of molecule (e.g. monoclonal antibodies versus small molecule inhibitors). While newer generations of cytotoxic chemotherapies do exist, and are often far from cheap, in general targeted therapies are more expensive than non-targeted therapies. That said, huge differences in cost per patient, per month exist within the targeted drug therapy category itself; this is even true for different brands of individual targeted compounds, a point we will come back to towards the end of this paper when we discuss generics and biosimilars in China.

Selected drug classes	Examples	Typical price range (per cycle)
Cytotoxics	Platinums, taxanes, pemetrexed, capecitabine	¥80 - ¥2,500 (higher for branded versions of newer molecules)
Small molecule EGFR tyrosine kinase inhibitors	Erlotinib, gefitinib, icotinib, afatinib, osimertinib	¥2,000 - ¥51,000 (equating one cycle to one month)
VEGF inhibitors	Bevacizumab, aflibercept	¥10,000+
Immune checkpoint inhibitors	Nivolumab, pembrolizumab	¥15,000+
Proteasome inhibitors	Bortezomib, carfilzomib	¥18,000+

Table 1: selected classes of anti-cancer drug therapies, and price ranges in China[7]

Lung Cancer: Same Mutations, Treated Differently Based on Income

Perhaps more so than for any other cancer type, lung cancer (specifically non-small cell lung cancer) has seen profound changes in its systemic drug treatment approach in the last fifteen years, with many new drugs that target specific molecular markers having been approved this decade alone. One such molecular markers is the EGFR mutation (or, more accurately, several different mutations that can be found in the EGFR gene within cancer cells). EGFR mutation-positive cancers are (depending on the mutation) generally more sensitive to the effects of EGFR-targeted drugs, and a range of these have been approved worldwide and in China.

Generic name	Brand name(s)	Indication
Gefitinib	Iressa, Yiruike	• EGFR mutation-positive, advanced or metastatic NSCLC patients
Erlotinib	Tarceva	• EGFR mutation-positive, advanced or metastatic NSCLC patients
Icotinib	Conmana	• EGFR mutation-positive, advanced or metastatic NSCLC patients
Afatinib	Giotrif	• Locally advanced or metastatic EGFR mutation-positive lung cancer patients who have not received any prior therapy with tyrosine kinase inhibitors (TKIs) • Patients with locally advanced or metastatic squamous cell carcinoma of the lung whose disease has progressed on or after treatment with platinum-based chemotherapy.
Osimertinib	Tagrisso	• Second-line treatment for EGFR T790M mutation-positive metastatic NSCLC patients

Table 2: selected EGFR inhibitors approved for lung cancer, and their indications

Sensitising EGFR mutations are particularly common in patients of Asian ethnicity[8], and it is therefore no surprise that the use of EGFR inhibitors plays an important role in treating lung cancer in China. The graph below shows the overall uptake of targeted therapies for EGFRm-positive patients in 17 major cities in China, based on the Ipsos Global Oncology Monitor survey, a pen-and-paper patient diary study conducted among cancer-treating physicians reporting on their drug-treated cancer patients. The study is based on a representative split of physician specialties and their patient caseload, and can therefore be considered as representative of the drug treatment of cancer within the 17 cities of focus. For additional detail on the study methodology, please refer to the technical note at the end of the paper.

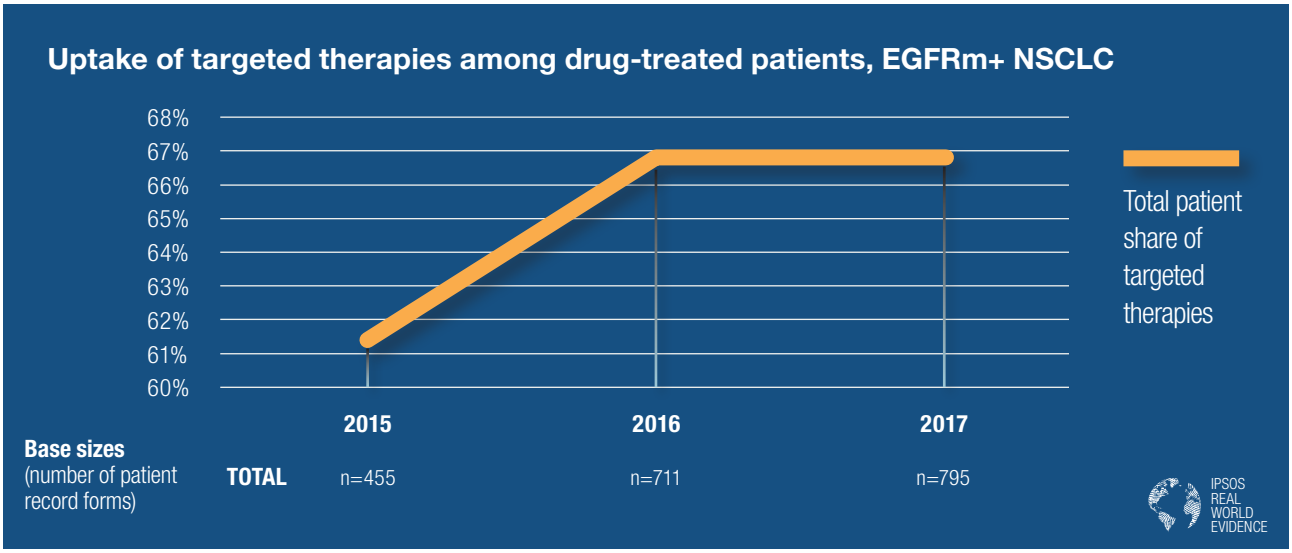


Fig. 1: Evolution of total targeted drug share over time, based on EGFRm-positive drug-treated NSCLC patient records collected across 17 cities in China. (Source: Ipsos China Oncology Monitor 2015 – 2017; research conducted through pen and paper diaries March 2015 – September 2017)

The story this simple line chart tells is largely positive: since 2016, over two-thirds of the drug-treated EGFRm-positive NSCLC patients reported in the survey are being treated with targeted therapies. While still considerably lower than in markets such as the US (where >85% of drug-treated EGFRm+ NSCLC were receiving a targeted therapy in 2015, a percentage which has increased further since then[9]), it nevertheless highlights that access to targeted anti-cancer therapies is currently achievable for nearly 70% of patients included in the study, in these 17 major urban centres. However, things get more complicated when the different city tiers are considered:

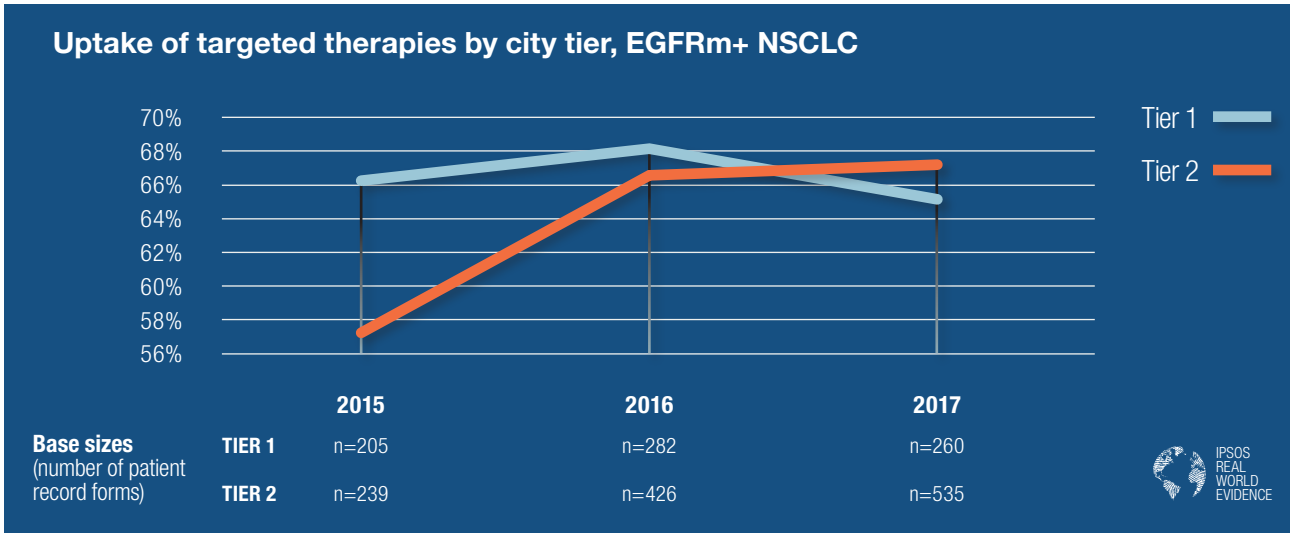


Fig. 2: evolution of total targeted drug share over time, based on EGFRm-positive NSCLC drug-treated patient records, segmented by city tier, collected across 17 cities in China. (Source: Ipsos China Oncology Monitor 2015 – 2017; research conducted through pen and paper diaries March 2015 – September 2017)

In 2015, 57% of EGFRm-positive NSCLC patients in Tier II cities in our survey were prescribed a targeted therapy, compared to 67% of patients in Tier I cities (p=0.041), indicating a clear gap in access to targeted therapies between the three most populous cities and the next city tier. It is worth noting that this gap has disappeared since 2016, at least at the overall targeted therapy class level. When individual targeted compounds are considered, however, differences between the city tiers still exist.

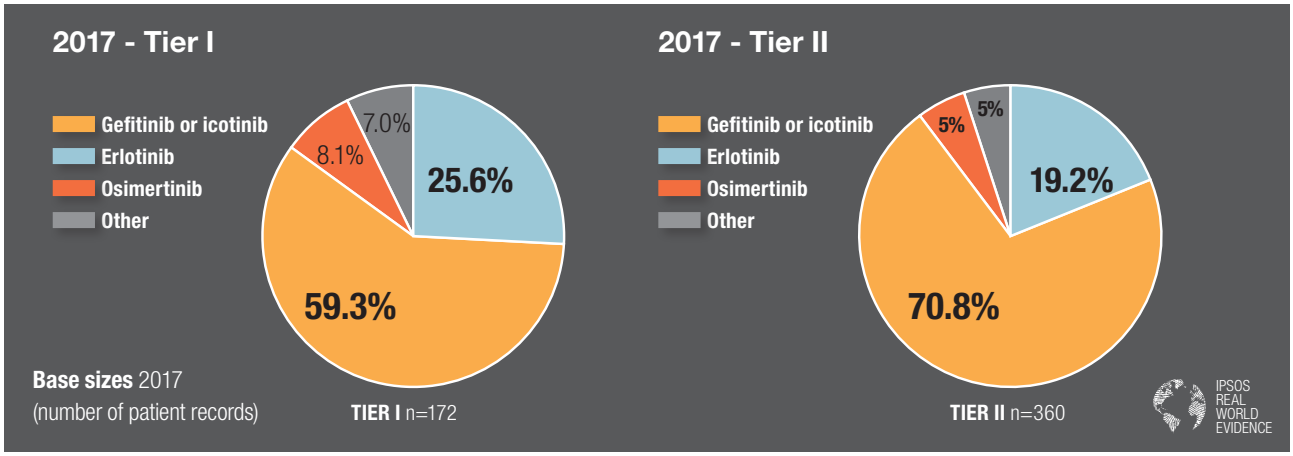


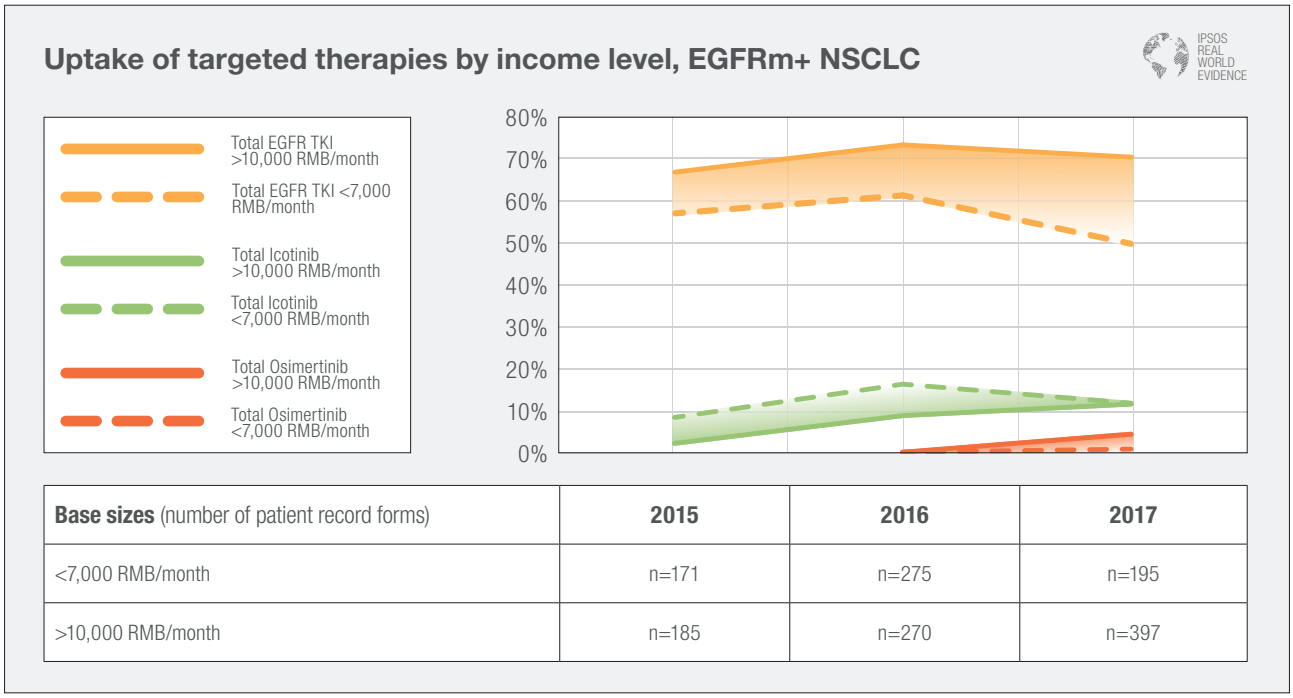
Fig. 3: share of individual molecules among EGFRm patients treated with targeted therapies, by city tier, based on NSCLC patient records collected across 17 cities in China. (Source: Ipsos China Oncology Monitor 2015 – 2017; research conducted through pen and paper diaries March 2017 – September 2017)

Osimertinib, which has a higher share in Tier I cities as our research suggests (although not statistically different at the 95% confidence level), is by far the most expensive of the EGFR inhibitors on the market. Erlotinib and gefitinib were, until recently, priced at approximately the same cost per cycle; however, since the approval of Yiruike – a local gefitinib brand – by the CFDA in February 2017, the cost of gefitinib has come down significantly, at least for those patients who are treated at hospitals where the local brand is available. Icotinib is also cheaper than both erlotinib and osimertinib; in other words, the two most affordable EGFR TKIs, icotinib and gefitinib, have a significantly (p=0.009) higher share of the EGFR TKI market in Tier II cities than in Tier I cities.

	Brand name	**Cost per cycle** (each cycle equated to one month of therapy)	**Days/month**
Erlotinib	Tarceva	¥7,500	Daily
Gefitinib	Iressa	¥7,074	Daily
Gefitinib	Yiruike	¥2,000	Daily
Icotinib	Conmana	¥5,995	Daily
Osimertinib	Tagrisso	¥51,000	Daily

Table 3: selected EGFR inhibitors approved for lung cancer, and cost per cycle7 (i.e. per month of drug treatment)

The differences in share are more pronounced when we analyse the uptake of targeted products by patients' monthly household income levels:



Base sizes (number of patient record forms)	**2015**	**2016**	**2017**
<7,000 RMB/month	n=171	n=275	n=195
>10,000 RMB/month	n=185	n=270	n=397

Fig. 4: uptake of EGFR TKIs over time, based on EGFRm-positive NSCLC patient record forms collected across 17 cities in China, by monthly household income level. (Source: Ipsos China Oncology Monitor 2015 – 2017; research conducted through pen and paper diaries March 2015 – September 2017)

The patients in our study in Tier I and Tier II cities with a monthly household income below 7,000 RMB are significantly ($p<0.001$) less likely to be prescribed EGFR inhibitors than patients with a monthly household income above 10,000 RMB: 70% of the more affluent patients are treated with one of these four small molecule inhibitors, compared to just 50% of the lower income patients. The latter are more likely to be prescribed non-targeted cytotoxic chemotherapies, which are generally cheaper but less efficacious, for the treatment of EGFR-mutated NSCLC[10]. One notable exception, however, is icotinib: until 2016, patients in our survey with lower monthly income levels were more likely to be treated with this less expensive targeted product, whereas the total combined share of erlotinib, gefitinib and osimertinib has been consistently higher in the high-income segment. With the approval of Yiruike in February 2017, we may see the gap in the use of gefitinib – and hence the total gap in EGFR TKI usage – between the lower and higher income segments starting to shrink.

Metastatic Colorectal Cancer: Add-Ons for The Rich

Colorectal cancer is another high-incidence cancer type in China, with a drug-treated prevalence in the 17 cities of focus of approximately 130,000 patients per year, of which an estimated 51,000 per year are treated in the metastatic setting[11]. Globally, targeted therapies, particularly anti-VEGFR and anti-EGFR monoclonal antibodies, form a key part of mCRC treatment, alongside cytotoxic chemotherapy regimens. Our data suggest that, in China, the uptake of these targeted therapies has been relatively modest, though differences based on patients' income levels are particularly obvious here.

Uptake of targeted therapies by income level, mCRC

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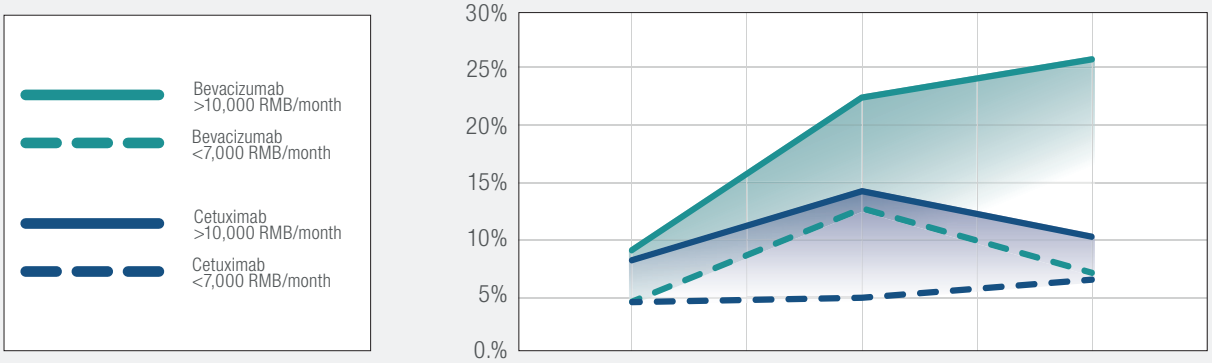


Base sizes (number of patient record forms)	**2015**	**2016**	**2017**
<7,000 RMB/month	n=291	n=245	n=259
>10,000 RMB/month	n=118	n=250	n=380

Fig. 5: uptake of bevacizumab and cetuximab over time within drug-treated metastatic colorectal cancer patient records forms collected across 17 cities in China, by monthly household income level. (Source: Ipsos China Oncology Monitor 2015 – 2017; research conducted through pen and paper diaries March 2015 – September 2017)

As the chart above illustrates, mCRC patients with a high monthly household income were significantly more likely to be prescribed bevacizumab in our 2017 survey, compared to those in the lower income bracket ($p<0.001$), and also more

likely to be prescribed cetuximab (difference not statistically different at 95% in 2017). Cytotoxic regimens such as FOLFOX, in combination with a VEGF inhibitor or an EGFR inhibitor, are generally considered to be the standard of care for first line metastatic colon cancer patients[12]; or at least, those who can afford it. Poorer patients would still be able to benefit to some extent from FOLFOX (or other cytotoxic-only regimens) without the addition of bevacizumab, which is prescribed to the more affluent patients to further increase the efficacy (PFS and OS) of their chemotherapy regimen[13].

	Brand name	Cost per cycle
Bevacizumab	Avastin	¥15,700-21,000
Cetuximab	Erbitux	¥15,000

Table 4: selected targeted therapies approved for mCRC, and cost per cycle[7]

	Total Cost per cycle
FOLFOX	¥1,900 – ¥8,400
FOLFOX + bevacizumab	¥22,900 – ¥29,400

Table 5: selected drug regimens approved for mCRC, and cost per cycle[7]

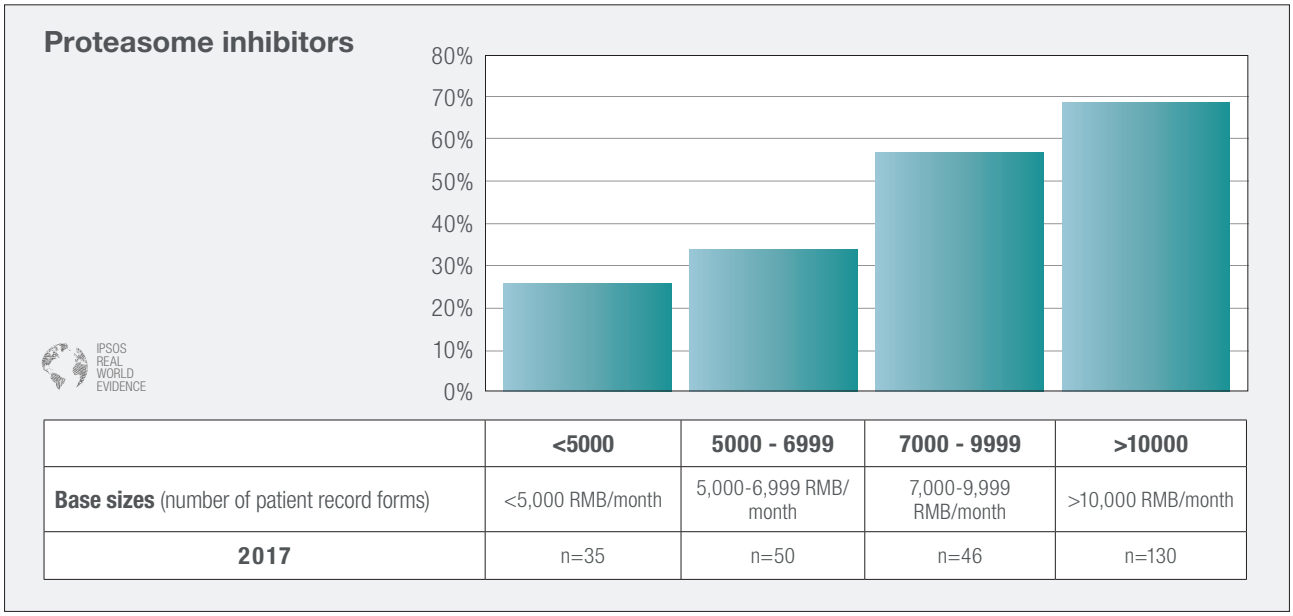
Multiple Myeloma: Who Can Afford to Inhibit Their Proteasomes?

Targeted therapies play an increasingly important role in haematological malignancies such as multiple myeloma, a blood cancer with an incidence of around 11,000 patients per year in China[14]. Proteasome inhibitors are a key part of the treatment paradigm, and part of the recommended primary therapies for multiple myeloma patients. They are, however, expensive.

	Brand name	Cost per cycle	Comments
Bortezomib	Velcade	¥18,754	-
Bortezomib	Qi Pu Le	¥12,000	Estimated cost; local brand launched in June 2018
Carfilzomib	Kyprolis	-	Not yet available in China

Table 6: selected proteasome inhibitors approved for multiple myeloma, and cost per cycle[7]

It is therefore not surprising that their usage is highly dependent on patients' income levels: as the following chart illustrates, there is an almost direct correlation between monthly household income and proteasome inhibitor share for multiple myeloma patients in the 17 cities of focus in China.

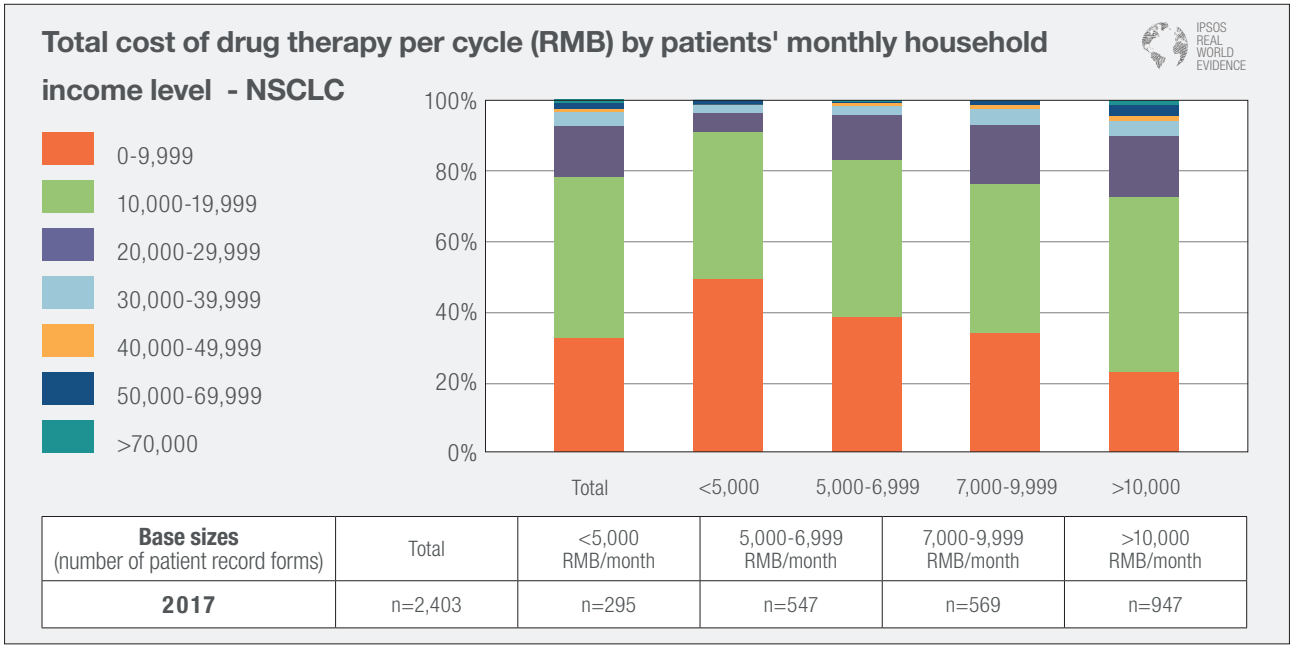


	<5000	5000 - 6999	7000 - 9999	>10000
Base sizes (number of patient record forms)	<5,000 RMB/month	5,000-6,999 RMB/ month	7,000-9,999 RMB/month	>10,000 RMB/month
2017	n=35	n=50	n=46	n=130

Fig. 6: usage of proteasome inhibitors, based on drug-treated multiple myeloma patient records, by monthly household income level. (Source: Ipsos China Oncology Monitor; research conducted through pen and paper diaries March 2017 – September 2017)

Tying It Together: Household Income Appears to be Strongly Correlated with Cost of Therapy

The previous sections highlighted that patients with lower household income levels are less likely to take targeted therapies. We also know that these targeted therapies are more expensive; it is therefore to be expected that the total cost of anti-cancer drug therapy per cycle is markedly lower for poorer patients, as the chart below clearly indicates:



Base sizes (number of patient record forms)	Total	<5,000 RMB/month	5,000-6,999 RMB/month	7,000-9,999 RMB/month	>10,000 RMB/month
2017	n=2,403	n=295	n=547	n=569	n=947

Fig. 7: total cost of anti-cancer drug therapy per cycle by monthly household income level, based on drug-treated NSCLC patient records. (Source: Ipsos China Oncology Monitor 2017; research conducted through pen and paper diaries March 2017 – September 2017)

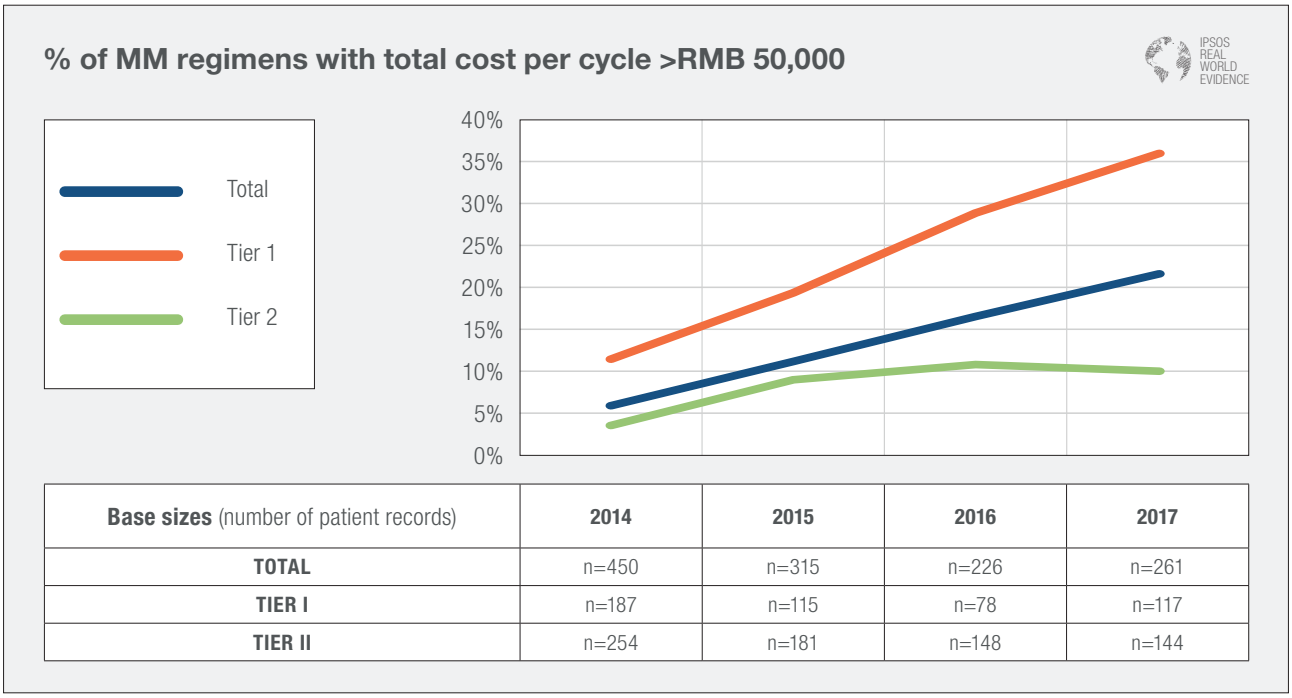
A few things are worth noting:

- The median cost of NSCLC anti-cancer drug therapy per cycle in the 17 Tier I and Tier II cities included in our survey in China is between RMB 10,000 and 20,000. This compares to a per capita disposable income (2016) in Shanghai of just over RMB 4,800 per month in Shanghai, and <RMB 3,000 per month in most Tier II cities[15]. One cycle of anti-cancer drug therapy is therefore far more expensive than what patients in China earn per month

- Patients in the lowest income band are being treated with anti-cancer regimens that cost less than RMB 10,000 per cycle in almost 50% of the cases, compared to less than 25% of patients in the highest income bracket. Clearly, doctors in the 17 major cities of focus in China tend to reserve these regimens for patients that are unable to afford more expensive treatments

- Nearly 30% of patients in the highest income bracket are prescribed regimens that cost over RMB 20,000 per cycle, compared to <10% of patients on low incomes

Much has been written in the press about the fact that, globally, costs of anti-cancer drug therapies are increasing at an alarming rate. Our data suggest that China is no different; the chart below shows the proportion of multiple myeloma regimens with a cost per cycle of over RMB 50,000, and how this has evolved over time:



Base sizes (number of patient records)	**2014**	**2015**	**2016**	**2017**
TOTAL	n=450	n=315	n=226	n=261
TIER I	n=187	n=115	n=78	n=117
TIER II	n=254	n=181	n=148	n=144

Fig. 8: proportion of multiple myeloma anti-cancer drug therapies with a total cost per cycle over RMB 50,000, by city tier, over time, based on patient records collected across 17 cities in China. (Source: Ipsos China Oncology Monitor 2014-2017; research conducted through pen and paper diaries March 2014 – September 2017)

The proportion of patient records in the China Oncology Monitor database, showing treatment with a regimen costing over RMB 50,000 per month has tripled in the space of four years. Furthermore, the gap between Tier I and Tier II cities has widened considerably: whereas over a third of multiple myeloma patients in Tier I cities now receive one of these expensive regimens, that percentage has stagnated to 10% in Tier II cities.

It should be clear by now that lower-income residents of the major cities in China are less likely to receive more expensive treatments for their cancers than more affluent inhabitants of the same 17 cities. The key question, however, is: are they doing worse than their richer counterparts as a result, i.e. is the lower cost of therapy leading to poorer outcomes?

Cost and Outcomes

ECOG performance status is one way of assessing cancer patients' overall wellbeing. The chart below shows the ECOG score at the time of the most recent doctor visit, for our study's multiple myeloma patients currently on anti-cancer therapy, by income levels:

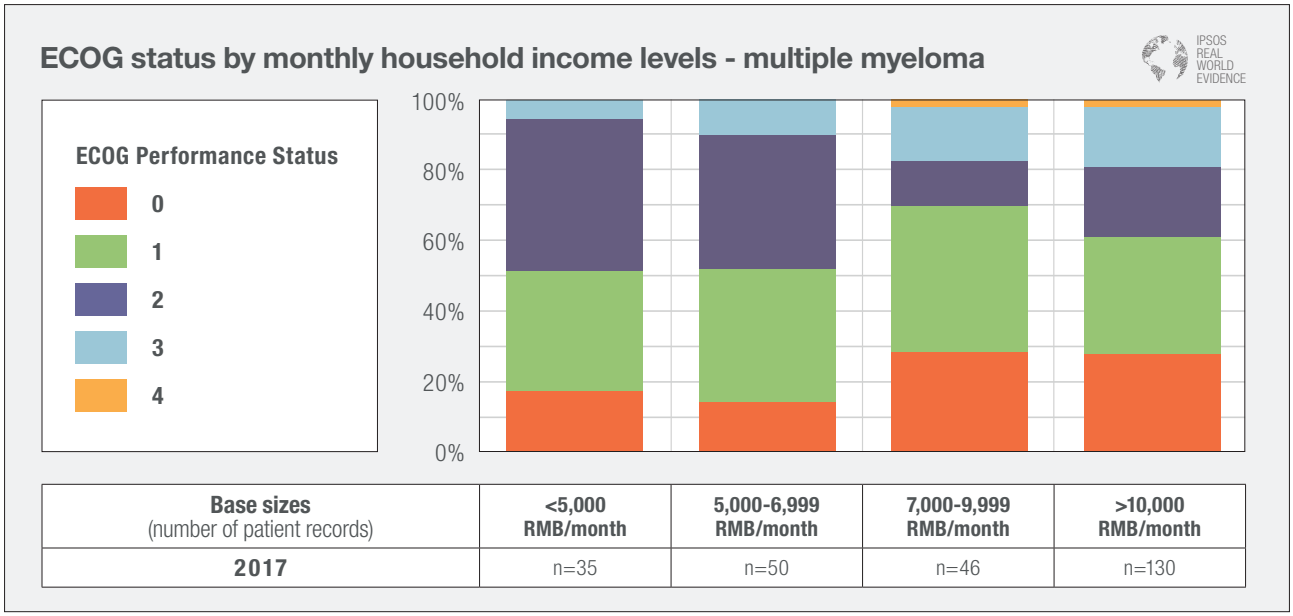


Fig. 9: ECOG performance status by monthly household income level, based on drug-treated multiple myeloma patient records. (Source: Ipsos China Oncology Monitor 2017; research conducted through pen and paper diaries March 2017 – September 2017)

Two interesting observations can be made from the chart above:

- Patients in our survey with income levels above RMB 7,000/month are significantly (p=0.045) more likely to have an ECOG status of 0 or 1 (the best performance statuses). In other words, a larger proportion of affluent drug-treated multiple myeloma patients are doing better overall than their less affluent counterparts. While we cannot exclude other factors playing a role in the correlation between performance status and income (such as access to better nutrition and general

better healthcare), it is likely that the higher usage of targeted anti-cancer drug therapies (which tend to have less severe side effects as well as a higher efficacy in slowing down disease progression) is part of the reason for the higher % of ECOG 0-1 patients in this group

- Somewhat paradoxically, there is also a higher % of patients with an ECOG status of 3 or 4 (the worst performance statuses) in the affluent group of patients in the database. Because patients with an ECOG status of 3 or 4 generally cannot tolerate most cytotoxic chemotherapies, many of these will simply not have any options for treatment available to them – unless they can afford targeted therapies with fewer toxicities

Another way of looking at outcomes is by analysing the length of time until progression. Shown here, for patients who were on their second line at the time of reporting, is the average number of cycles received during the first metastatic line before disease progression, by income levels.

Length of 1st line (number of cycles until progression) by monthly household income in 2nd line mNSCLC

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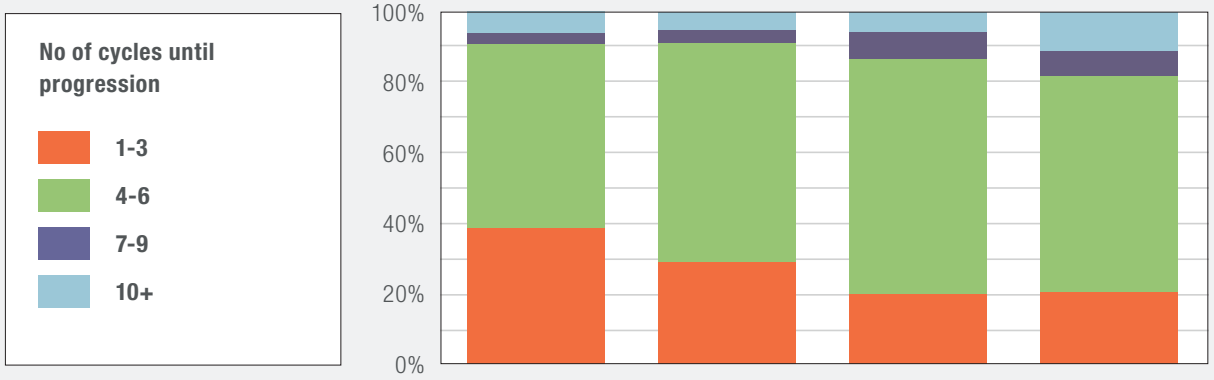

Base sizes (number of patient records)	<5,000 RMB/month	5,000-6,999 RMB/month	7,000-9,999 RMB/month	>10,000 RMB/month
2017	n=31	n=86	n=115	n=199

Fig. 10: length of prior 1st line (until disease progression) by monthly household income level, based on 2nd line drug-treated metastatic NSCLC patient records. (Source: Ipsos China Oncology Monitor 2017; research conducted through pen and paper diaries March 2017 – September 2017)

Patients in the lowest income brackets in our sample often only stay on their 1st line for just 1-3 cycles prior to a switch due to disease progression, whereas a significant proportion of more affluent patients stay on therapy for 7 or more cycles. This indicates a direct correlation between PFS and income levels for 1st line mNSCLC patients in the 17 major cities of focus in China. Again, there is a strong indication that richer cancer patients – those who are more likely to be receiving more expensive targeted therapies – have better treatment outcomes than poorer patients in these cities.

Conclusion

The recent revolution in our war against cancer has not bypassed China: here, too, targeted therapies are increasingly used in Tier I and Tier II cities. However, a large swathe of the urban population – even in these major cities – is unable to benefit from these advances, simply due to the fact that they cannot afford the latest therapies. Not only is this leading to a very different treatment landscape for patients in high vs low income brackets, it is also having a real, tangible impact on their respective outcomes. If you're a cancer patient in China, you are clearly more likely to do better if you're rich, despite the existence of national and regional insurance programmes.

We should not forget, however, that anti-cancer drug treatment in China has come a long way. If we go back 10 years, hardly any of the patients in our database – rich or poor – were treated with targeted therapies, as the table below illustrates. The push towards better treatment had to start somewhere, and perhaps it is not surprising that it was the higher income group that was the first to benefit from this. Additionally, China is far from the only market where access to anti-cancer drugs is marked by inequality.

NSCLC	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Base size (number of patient records)	1747	1841	1896	2065	2139	2205	2609	2330	2389	2403
Targeted drug share	4.6%	4.1%	4.9%	7.7%	9.4%	12.1%	16.2%	21.5%	24.8%	28.3%

mCRC	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Base size (number of patient records)	432	517	495	544	541	564	760	752	825	860
Targeted drug share	7.6%	6.2%	6.5%	6.3%	10.2%	8.3%	12.6%	15.0%	22.5%	27.3%

Table 7: Evolution of targeted therapy share in major cities in China, in NSCLC and mCRC, based on drug-treated patient records. (Source Ipsos China Oncology Monitor; research conducted through pen and paper diaries March 2008 – September 2017)

Importantly, the National Health Commission in China is continuing to make efforts to address the affordability concerns by implementing further price reductions for anti-cancer drugs, through centralised negotiations and procurement. One such round of price cuts was announced by the NHC in July 2018[16], shortly after an announcement from the Ministry of Finance that it will exempt a number of drugs from import tariffs, as part of wider opening of the market. This may lead to an influx of more affordable drugs from markets such as India.

Furthermore, the fast uptake of biosimilars in China is also set to play an important role in addressing the gap in affordability when it comes to biologic therapies such as bevacizumab, trastuzumab, rituximab and other monoclonal antibodies. While no biosimilars are on the market for these oncology drugs at the time of writing in China, several local companies are running phase three clinical trials for a range of biosimilar products (such as Innovent's IBI301 and IBI305, Henlius' HLX01 and HLX02 and Qilu's ALT-L2, licensed from Alteogen), alongside multinational companies who are also eyeing the Chinese market. The biologics segment in other therapy areas, most notably the autoimmune diseases such as rheumatoid arthritis, has been dominated for years by local Chinese biosimilars (such as Sunshine Guojian's Yisaipu and Celgen Biopharma's Qianke) due to their lower cost; this is a good indication that – unlike in some established markets –

the anti-cancer biosimilars, once approved, are likely to see rapid adoption in China, significantly bringing down the average cost of therapy for several cancer indications.

These steps are clearly necessary. To put things into perspective: the sales of anticancer medicines in China already exceed an estimated RMB 120 billion per year[17], or approximately USD 18 billion. As we have seen, only a small percentage of the population – even in the largest cities – currently have access to the more expensive cancer therapies. Clearly, treating the majority of eligible Chinese cancer patients with targeted therapies would lead to a staggeringly high – and unsustainable – total spend, unless the average cost per cycle of these innovative drugs comes down considerably.

In conclusion, while most of this paper arguably painted a rather depressing picture about the state of equal access to the most effective anti-cancer therapies in China, there are several reasons to be cautiously optimistic about the future. We started this paper by stating that the war against cancer is undergoing a remarkable revolution, which holds the promise of finally turning the tide and conquering this enemy in the coming decades. It is likely that a significant proportion of the population in China will unfortunately miss out on this revolution due to simply not being able to afford the latest molecular tools and drugs; however, provided that long-term efforts continue to be made to address this affordability gap, we can hold on to the hope that one day, every single patient in China – and indeed the rest of the world – will be able to conquer their cancer.

About the Research

Between March 2014 and September 2017, drug treatment patterns were investigated using the Ipsos Global Oncology Monitor©, a patient record database. Specifically, a panel of cancer-treating physicians based in China reported on drug-treated cancer patients, across 17 cities in China, seen in consultation during the study period. Physicians taking part in the study were screened for specialty and level of seniority and had to be the main treatment decision-makers for their patients. They provided a set number of patient records during the fieldwork period. Research was conducted through pen and paper diaries.

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