Report prepared for the Medicines Australia Oncology Industry Task Force

Reimbursement success rates and timelines for new medicines for cancer; an international comparison

3 February 2014

Michael Wonder - Wonder Drug Consulting Pty Ltd

PO Box 470 Cronulla NSW 2230 wonderdrug@optusnet.com.au

FOREWORD

The Pharmaceutical Benefits Scheme (PBS) has served Australians well for over 60 years, but is now struggling to keep pace with technological advances in cancer treatment and clinical practice. Australian cancer patients need, expect and deserve timely access to the latest cancer drugs under a system that is fair, equitable and sustainable for all stakeholders.

Cancer patients do not have the luxury of several years to wait for new advances to be made available – such delays are not only unacceptable clinically but are unacceptable to the community at large.

Medicines Australia has believed for some time that access to cancer medicines, along with medicines for other diseases, has been increasingly delayed as a result of prolonged deliberations by the Pharmaceutical Benefits Advisory Committee and/or approval by the Commonwealth Government.

The Medicines Australia Oncology Industry Taskforce therefore commissioned an independent analysis around Australia's performance, with respect to access to new oncology medicines, compared with other countries.

The analysis confirms that while Australian patients ultimately get the same access as other comparable countries, they generally wait longer for that access. Such delays in PBS listing have created a two-tiered health system – one for the wealthy and one for the average Australian.

The analysis also demonstrates that comparable countries are struggling with the challenge of access to cancer medicines, that different solutions are being tried but that no country has yet "cracked this nut".

Medicines Australia believes that the issues of access related to cancer medicines are a clear example of some of the underlying problems in ensuring timely and affordable access to all new medicines. There is an opportunity for Australia to take a leadership role with all stakeholders, including government, healthcare professionals and health consumer organisations, working together to improve access.

Medicines Australia holds the strong view that only by bringing together the expertise of those engaged in cancer treatment and support will we achieve the shared goal of world's best practice in cancer treatment in Australia.

Dr Brendan Shaw
Chief Executive
Medicines Australia

Table of Contents

Executive Summary

The objective of the project was to conduct an international comparison of access to new oncology medicines in five countries (Australia, Canada, England, Germany and France) over a 5-year period, by examining recommendation rates and the time taken to secure access for patients.

Overall the project found that while recommendation rates in Australia were broadly comparable with those in other countries, on average it took more time to achieve access

Specifically, the project found that:

- Australia's recommendation rate for new and subsequent listings was comparable with Canada, with around 25% of new cancer medicines failing to secure reimbursement in these jurisdictions
- Australia's recommendation rate for new and subsequent listings appears to be lower than the corresponding rates in France and Germany
- Australia's recommendation rate was greater than that for England, but the creation of the Cancer Drugs Fund has led to a recent major improvement in access
- The mean time from registration to listing in Australia was longer than in most other countries for both new and subsequent listings
- Access to new medicines for certain cancers such as colorectal cancer, non small-cell lung cancer and breast cancer seems to be poorer in Australia

The project also noted that:

- Price reductions were invariably required to obtain a recommendation or listing in Australia, Canada and England
- Risk share arrangements are often associated with listings
- The average number of submissions required to attain a positive PBAC recommendation ranged from 2.3 to 2.5 respectively for new and subsequent listings

The study sample was submissions considered by the PBAC for medicines for patients with cancer. The study sample was comprised of first listings (i.e. new medicines and subsequent listings (i.e. new indications).

The study was conducted over a five calendar year study period (i.e. 2008 – 2013). Calendar year was the calendar year of consideration by the PBAC rather than calendar year of a submission to the PBAC.

Comparisons were made with HTA agencies in the following countries:

- The Pan Canadian Oncology Drug Review (pCODR) Expert Review Committee (pCERC) in Canada. The pCODR process has only been in operation since late 2011.
- The National Institute for Health and Care Excellence (NICE) in England.
- The Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (Institute for Quality and Efficiency in Health Care; IQWiG) and the Gemeinsamer Bundesausschuss (G-BA) in Germany. The IQWiG seldom assessed new medicines for patients with cancer before the AMNOG reforms that were introduced in 2011.
- The Transparency Commission (TC) in France

Data were sought/collected for each medicine/patient population pairing in each country:

- Date of registration
- Number of submissions (Australia only)
- TGA/PBAC parallel processes (Australia only)
- Date/s of most recent outcome/s
- Most recent outcome/s (i.e. recommended, not/recommended, deferred, unresolved)
- Date of the public announcement of most recent outcome/s
- Price reduction (Australia, Canada and England)
- Risk share agreement (Australia only)
- Date of listing/implementation

The Cancer Drugs Fund (CDF) was introduced in England in April 2011 to provide a means by which National Health Service (NHS) patients in England were able to access cancer medicines that are not routinely available on the NHS. The analysis included the listing of new cancer medicines on the NHS and the CDF.

In the analysis, access to a given medicine was measured as a binary variable (i.e. 'Yes/Accessible' or 'No/Not accessible'); no attempt was made to determine if there might be any meaningful differences in access to a given medicine that is reimbursed/listed in some/all countries.

Assumptions needed to be made regarding listing/implementation dates in some countries.

The following time to event analyses were also conducted:

- Mean time from registration to listing/implementation (days)
- Mean time from (most recent) outcome to listing/implementation (days)

Insofar as some of the HTA agencies were either not established at the beginning of the study period (Canada) or they underwent major reform during the study period (England and Germany), some medicines in the study sample were listed before they were assessed/appraised resulting in some negative values for the time from the date of most recent outcome to the date of listing/implementation. The results for these countries on this metric should be interpreted with caution.

Simple descriptive statistical analysis was conducted. Insofar as recommendations and listings continue to occur; the situation is dynamic. Nonetheless, the results are current as at 3 February 2014.

The study sample is comprised of 19 first listings and 29 subsequent listings (Tables 2 & 3).

The results for the international comparison for new listings are presented in Table A and for subsequent listings in Table B.

The results need to be interpreted with caution given the small sample sizes in some jurisdictions, the use of multiple assumptions and the presence of negative values for some medicines in the time to event analyses.

Table A – International comparison for new listings

Attribute	Australia	Canada (ON)	Canada (BC)	England	Germany	France
Number assessed	19	9	9	11	7	15
Number (%) accepted/recommended*	12 (63%)	7 (78%)	5 (55%)	3 (27%)	6 (86%)	14 (93%)
Number listed/implemented	9	8**	11**	11**	9**	14
Time from registration to listing (days) (range)	589 (96-1588)	465 (198-734)	443 (229-749)	584 (30-2270)	378 (90-579)	256 (93-670)
Time from registration to listing (months) (range)	19.5 (3.2 to 52.5)	15.4 (6.5 to 24.3)	14.6 (7.6 to 24.8)	19.3 (1.0 to 75.0)	12.5 (3.0 to 19.1)	8.5 (3.1 to 22.1)
Time from acceptance/recommendation to listing (days) (range)	208 (141 to 355)	200 (91 to 362)	80 (-728 to 517)	230 (-327 to 1528)	180 (180 to 180)	90 (90 to 90)
Time from acceptance/recommendation to listing (months) (range)	6.9 (4.7 to 11.7)	6.6 (3.0 to 12.0)	2.6 (-24.1 to 17.1)	7.6 (-10.1 to 50.5)	6.0 (6.0 to 6.0)	3.0 (3.0 to 3.0)

* The number of medicines accepted or recommended/number of medicines assessed, where acceptance = recommended in Australia, Canada & England, G-BA resolution of at least a minor added benefit and an ASMR rating of V or better in France.

** In Canada, the number of medicines listed/implemented is greater than the number recommended by the pERC as some were listed in the provinces before the creation of the pCODR process. In England, the number of medicines listed/implemented is greater than the number of medicines that have been recommended by NICE because of the Cancer Drugs Fund List. In Germany, the number of medicines listed/implemented is greater than the number of medicines that have been assessed by the G-BA because some medicines were listed/implemented before the 2011 AMNOG reforms.

The results presented in Table A indicate that the PBAC recommendation rate for the new listings for patients with cancer was broadly comparable to the acceptance rates in Canada, lower than the 'recommendation' rates for the IQWiG in Germany and the TC in France and greater than the recommendation rate for NICE in England. Comparisons to Germany and France are less amenable due to differences in how the agencies in these countries express their determinations. While the mean time from registration to listing/implementation for new listings in Australia appears to have been longer than most countries (except England), the mean time from acceptance/recommendation to listing/implementation in Australia was comparable to most other countries. Some of the comparisons need to be interpreted with

caution due to the presence of negative values. (Negative values are the result of some medicines being listed before they were accepted/recommended).

Table B – International comparisons for subsequent listings

Attribute	Australia	Canada (ON)	Canada (BC)	England	Germany	France
Number assessed	29	3	3	15	1	24
Number (%) accepted/recommended*	18 (62%)	3 (100%)	3 (100%)	4 (29%)	Assessment is on-going	24 (100%)
Number listed/implemented	14	4**	3**	18**	25**	22
Time from registration to listing (days) (range)	741 (155 to to 2400)	300 (258 to 341)	40 (-246 to 325)	474 (30 to 1502)	90 (90 to 90)	365 (90 to 1054)
Time from registration to listing (months) (range)	24.5 (5.1 to 79.3)	9.9 (8.5 to 11.3)	1.3 (-8.1 to 10.7)	15.7 (1.0 to 49.7)	3.0 (3.0 to 3.0)	12.1 (3.0 to 34.8)
Time from acceptance/recommendation to listing (days) (range)	242 (114 to 419)	251 (118 to 504)***	-181 (-456 to 251)***	90 (90 to 90)	Not applicable	90 (90 to 90)
Time from acceptance/recommendation to listing (months) (range)	8.0 (3.8 to 13.9)	8.3 (3.9 to 16.7)	-6.0 (15.1 to 8.3)	3.0 (3.0 to 3.0)	Not applicable	3.0 (3.0 to 3.0)

* The number of medicines accepted or recommended/number of medicines assessed, where acceptance = recommended in Australia, Canada & England, G-BA resolution of at least a minor added benefit and an ASMR rating of V or better in France.

** In Canada, the number of medicines listed/implemented is greater than the number recommended by the pERC as some were listed in the provinces before the creation of the pCODR process. In England, the number of medicines listed/implemented is greater than the number of medicines that have been recommended by NICE because of the Cancer Drugs Fund List. In Germany, the number of medicines listed/implemented is greater than the number of medicines that have been assessed by the G-BA because some medicines were listed/implemented before the 2011 AMNOG reforms.

*** These medicines were registered and reimbursed before the introduction of the pCODR process.

The results presented in Table B suggest that the PBAC recommendation rate for subsequent listings for patients with cancer was lower than the 'recommendation' rates in Canada and France and greater than the recommendation rate for NICE in England. While the mean time from registration to listing/implementation for subsequent listings in Australia appears to have been longer than most of the other countries, the mean time from acceptance/recommendation to listing/implementation in Australia was comparable to most other countries. Once again, the analysis is confounded by negative values.

Access to new medicines for patients with colorectal cancer appears to be poorer in Australia with no subsidized access to aflibercept and panitumumab; the latter has been recommended by the PBAC for second-line use but remains unlisted. Access to new medicines for patients with non small-cell lung cancer also seems to be slightly poorer in Australia with no subsidized access to crizotinib, afatinib dimaleate and pemetrexed disodium heptahydrate; afatinib dimaleate and pemetrexed disodium heptahydrate have been recommended by the PBAC but have not been listed on the PBS as at 3 February 2014. Access to new medicines for patients with breast cancer also seems to be slightly poorer in Australia with no subsidized access to eribulin mesylate and everolimus; both were recently recommended by the PBAC so they may well be listed on the PBS soon.

The results from the time to event analyses suggest while the mean times from registration to listing/implementation for new and subsequent listings in Australia appear to be longer than in Canada, the mean time from acceptance/recommendation to listing/implementation in Australia for new listings is comparable to Canada. The results for the subsequent listings for Canada are misleading as some medicines were listed before the creation of the new pCODR

process. Comparisons with other countries are problematic given the number of assumptions required.

The time to event results for Australia present a very mixed picture with the time from registration to listing being long for some medicines (e.g. 1,588 days for bevacizumab for colorectal cancer and 2,400 days for cetuximab also for colorectal cancer) and short for others (e.g. 96 days for dabrafenib mesylate for malignant melanoma).

The results indicate that a price reduction is almost always required to secure a recommendation and subsequent listing in Australia, Canada and England. In the case of Australia, the information regarding price reductions was sourced solely from the PBAC Public Summary Documents; it is possible that the prices of some other medicines in the study sample have been reduced and that this has not been made public. Price reductions were not confined to those medicines that were recommended.

Risk-share agreements are now in frequent use being associated with one in every two medicines recommended by the PBAC. This could be an underestimate, as some might not have been reported in the Public Summary Documents.

The average number of submissions required to obtain a PBAC recommendation was 2.3 for new listings and 2.5 for subsequent listings. It is unclear if these results are any better or worse than for submissions for new/subsequent listings for non-cancer medicines.

The initial submission for six of the 19 new listings and three of the 26 subsequent listings was evaluated under the new TGA/PBAC parallel process. All nine submissions were rejected.

Whilst this study was not designed to evaluate the effects of the recent reforms in England, Germany and Canada on patient access to new cancer medicines, it is clear that the creation of the Cancer Drugs Fund in England in 2011 has improved access. The Fund has improved the access to new listings from 3 to 11 and access to subsequent listings from 4 to 18.

The analysis was conducted with Australia as the control country. The results might have been different with another country as the control, identifying new medicines that are yet to be considered by the PBAC. At the time of the analysis, there were at least 12 new oncology medicines that had not been considered by the PBAC but had been considered by at least one HTA agency in the other four countries.

Introduction

Recently, cancer patients, medical professionals caring for cancer patients, and the medicines industry have expressed concerns about the increasing challenges in gaining timely, affordable and equitable patient access to new medicines for cancer in Australia via the Pharmaceutical Benefits Scheme (PBS).

In response, several member companies of Medicines Australia formed the Oncology Industry Taskforce (OIT) in late 2012. These companies decided to form the OIT against the background of what they perceived to be an increasingly difficult reimbursement environment in Australia in relation to timely access to new medicines for patients with cancer.

Following the launch of the Deloitte Access Economics report, *Access to Cancer Medicines in Australia*, the OIT invited submissions for comments/feedback on its initial findings. The OIT is interested in determining how access to new medicines for patients with cancer via the PBS compares with their access in other comparable countries.

The objective of the project was to determine success rates and certain time to event metrics for submissions to the PBAC for new medicines for patients with cancer and to compare these results to those for the same sample of medicines following their assessment/appraisal by comparable health technology assessment (HTA) agencies in other countries.

Methods

The study sample was submissions considered by the PBAC for medicines for patients with cancer. Submissions for the various anti-nauseants, anti-resorptive agents and colony-stimulating factors commonly used to treat patients with cancer were excluded.

The study sample was comprised of:

- First listings (i.e. new medicines). This term has been used despite some medicines have not actually been 'listed' in a reimbursement schedule/formulary/list in some countries. The first listing might not have been the first registered indication (e.g. the first registered indication for sorafenib tosylate in Australia was for certain patients with renal cell carcinoma whereas its first listing on the PBS was for patients with liver cancer). Likewise the first reimbursed indication for cetuximab in Australia was for certain patients with head and neck cancer despite its first TGA registered indication being for certain patients with colorectal cancer.
- Subsequent listings (i.e. new indications).

The coding of the many PBAC submissions for everolimus (as Afinitor) was not straightforward insofar as everolimus (as Certican) has been listed on the PBS since 1 August 2005 for use by kidney and heart transplant recipients. For the purposes of this study, it was assumed that all the submissions for Afinitor (i.e. for use by patients with cancer) were for subsequent listings.

The study was conducted over a five calendar year study period (i.e. 2008 – 2013). Calendar year = calendar year of consideration by the PBAC rather than calendar year of a submission to the PBAC.

Comparisons were made with HTA agencies in the following countries:

- The Pan Canadian Oncology Drug Review (pCODR) Expert Review Committee (pCERC) in Canada. The pCODR process has only been in operation since late 2011.
- The National Institute of Health and Care Excellence (NICE) in England
- The Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (Institute for Quality and Efficiency in Health Care; IQWiG) and the Gemeinsamer Bundesausschuss (G-BA) in Germany. The IQWiG seldom assessed new medicines for patients with cancer before the AMNOG reforms that were introduced in 2011.
- The Transparency Commission (TC) in France

Data were sought/collected for each medicine/patient population pairing in each country:

- Date of registration
- Number of submissions (Australia only)
- TGA/PBAC parallel processes (Australia only)
- Date/s of most recent outcome/s
- Most recent outcome/s (i.e. recommended, not/recommended, deferred, unresolved)

- Date of the public announcement of most recent outcome/s
- Price reduction (Australia, Canada and England)
- Risk share agreement (Australia only)
- Date of listing/implementation

The Cancer Drugs Fund (CDF) was introduced in England in April 2011 to provide a means by which National Health Service (NHS) patients in England were able to access cancer medicines that are not routinely available on the NHS. The analysis included the listing of new cancer medicines on the NHS and the CDF.

In the analysis, access to a given medicine was measured as a binary variable (i.e. 'Yes/Accessible' or 'No/Not accessible'); no attempt was made to determine if there might be any meaningful differences in access to a given medicine that is reimbursed/listed in some/all countries.

Assumptions needed to be made regarding listing/implementation dates in some countries.

The following time to event analyses were also conducted:

- Mean time from registration to listing/implementation (days)
- Mean time from (most recent) outcome to listing/implementation (days)

Insofar as some of the HTA agencies were either not established at the beginning of the study period (Canada) or they underwent major reform during the study period (England and Germany), some medicines in the study sample were listed before they were assessed/appraised resulting in some negative values for the time from the date of most recent outcome to the date of listing/implementation. The results for these countries on this metric should be interpreted with caution.

The definitions and data sources for the major variables are summarized in Table 1.

Table 1 – Definitions and data sources for the key variables

Variable	Australia	Canada	England	Germany	France
HTA agency	PBAC	pCODR	NICE	IQWiG	TC
Date of registration	For new listings, the date of entry in the Australian Register of Therapeutic Goods (ARTG) was used as the date of registration. For subsequent listings, the date of approval by the TGA was used as the date of registration. Data source: TGA website (AusPAR, Approved PI and ARTG register)	For new listings, date of its approval by the Therapeutic Directorate of Health Canada (i.e. the date of the Notice of Compliance letter) was deemed to be the date of its registration. Registration dates for subsequent listings are not readily available. Date source: Health Canada website	The date of a medicine's approval by the European Commission was deemed to be the date of its registration. Data source: EMA website	The date of a medicine's approval by the European Commission was deemed to be the date of its registration. Data source: EMA website	The date of a medicine's approval by the European Commission was deemed to be the date of its registration. Data source: EMA website
Outcome categories	• Recommendation • Rejection • Deferral • No outcome Data source: PBS website (PBAC outcomes and PBAC Public Summary Documents)	• Recommendation • Rejection Data source: pCODR website	• Recommended • Not recommended • No outcome (medicine has not been assessed/appraised by NICE, the assessment is on-going or the assessment has been terminated) Data source: NICE website	Level of added benefit: • Major benefit • Significant benefit (considerable benefit) • Marginal benefit (minor benefit) • Not quantifiable added benefit • No added benefit • Less benefit Level of substantiation: • Proof • Indication • Hint • No proof The IQWiG does not assess the level of added benefit and level of substantiation of orphan drugs. Data source: IQWIG website	SMR (Medical benefit): • Major • Important • Moderate • Weak • Insufficient ASMR Improvement in medical benefit): • I (major improvement) • II (important improvement) • III (significant improvement) • IV (minor improvement) • V (no improvement) • Insufficient Data source: HAS website

Variable	Australia	Canada	England	Germany	France
Risk-share agreement	A risk share agreement/arrangement either proposed applicant/sponsor or by the PBAC might have been required to obtain a recommendation. This does not imply that risk share agreements were not proposed in submissions that were deferred or rejected. Insofar as the Public Summary Documents do not always report on risk share agreements, the data on price reductions reported in the 'Results' section might not be complete. Data source: PBS website (PBAC Public Summary Documents)	Not assessable	Not assessable	Not assessable	Not assessable
Price reduction	A price reduction either proposed by the applicant/sponsor or by the PBAC might have been required to obtain a recommendation. This does not imply that price reductions were not proposed in submissions that were deferred or rejected. Insofar as the Public Summary Documents do not always report on price reductions, the data on price reductions reported in the 'Results' section might not be complete. Data source: PBS website (PBAC Public Summary Documents)	An imposed price reduction was deemed to have occurred if the pERC recommendation was conditional on the cost-effectiveness of the medicine in question being improved to an acceptable level. Information on (imposed) price reductions for medicines that have not been considered by the pERC is not in the public domain. Data source: pCODR website (pERC final recommendations)	An imposed price reduction was deemed to have occurred if it was noted in the FAD that the sponsor of the medicine was willing to support a patient access scheme. Data source: NICE website (FADs)	Not assessable	Not assessable

Variable	Australia	Canada	England	Germany	France
Date of most recent HTA agency outcome	The date of the most recent meeting was used; in some instances, the PBAC may have considered the medicine/patient population pair at a previous meeting. If the meeting lasted more than one day, the last day was used as the meeting date. The dates of outcomes made at special/out of session meetings are not in the public domain; when the month (and year) of the meeting was known, it was assumed that the meeting was held on the 15th day of the month. Data source: PBS website (PBS calendar)	A submission for a given medicine is considered by the pERC on two occasions; at an initial meeting (initial outcome) and at a reconsideration meeting (i.e. final outcome). For a medicine that has been assessed and appraised by the pERC, the date of its final consideration by the pERC (i.e. reconsideration meeting) was deemed to be the date of the most recent outcome. Data source: pCODR website	For a medicine that has been assessed and appraised by NICE, the date of last NICE Appraisal Committee meeting was deemed to be the date of the most recent outcome. Data source: NICE website	For a medicine that has been assessed by IQWiG, the date of last IQWIG Assessment Report (German language version) was deemed to be the date of the most recent IQWiG outcome. Data source: IQWIG website	For a medicine that has been appraised by the TC, the date of TC's opinion (French language version) was deemed to be the date of the most recent TC outcome. Data source: HAS website
Date of the public announcement of HTA agency outcome	For outcomes made at a scheduled PBAC meeting, the date of their public announcement was stated in the PBS calendar (i.e. 6 weeks after the PBAC meeting). The PBS calendar does not state when outcomes from special/out of session meetings will be made public. It was assumed that outcomes from these meetings were made public 6 weeks after the meeting. Data source: PBS website (PBS calendar)	The date of the issuance of the final pERC outcome was deemed to be the date of public announcement of the outcome. Data source: pCODR website	For a medicine that has been assessed and appraised by NICE, the date of the public release of the Final Appraisal Determination (FAD) was deemed to be the date of its public announcement. Data source: NICE website	For a medicine that has been appraised by the G-BA, the date of G-BA's resolution (German language version) was deemed to be the date of the public announcement of the G-BA outcome. Data source: G-BA website	For a medicine that has been appraised by the TC, the date that the TC's opinion was published on-line was deemed to be the date of the most recent TC outcome. Data source: HAS website

Date of listing/implementation	The date of a medicine's listing in the Schedule of Pharmaceutical Benefits was deemed to the date of its listing/implementation. Data source: PBS website (serial issues of the Schedule of Pharmaceutical Benefits)	Canada does not have a national reimbursement formulary. An attempt was made to use the date of a medicine's listing in the Cancer Care Ontario Drug Formulary as a proxy. It is not possible to determine a medicine's listing in the formulary from the Cancer Care Ontario Drug Formulary website. Data source: Ontario Drug Benefit website The analysis also considered listings in the British Colombia Cancer Care Drug Benefit List. Insofar as back issues of the British Colombia Cancer Care Drug Benefit List are not available, the response categories were 'listed' or 'not listed.' Data source: British Colombia Cancer Care Drug Benefit List For those medicines that have been assessed and appraised by the pERC under the pCODR process, the dates of their funding in all Canadian provinces, including Ontario and British Columbia, are available from the pCODR website. Data source: pCODR website	England does not have a national reimbursement formulary. The National Cancer Drugs Fund commenced in 1 April 2011 to provide patient access to certain new medicines for cancer. The National Cancer Drugs List is updated regularly; unfortunately back copies of the list are not available so it is not possible to determine when medicines were first added to the list. **Medicines currently under assessment/appraisal by NICE** It is possible for a medicine to be approved for the National Cancer Drugs List while it is being considered by NICE. For a medicine that has been approved for the National Cancer Drugs List and is currently under review by NICE, it has been assumed that the date of its listing in the National Cancer Drugs List was 90 days after its registration by the European Commission. **Medicines recommended by NICE** Insofar as NICE recommendations should be implemented within 3 months, the date of implementation for a medicine recommended by NICE has been deemed to be 90 days after the public release of NICE's FAD for the medicine. **Medicines not recommended by NICE** For a medicine that has been approved for the National	Germany does not have a national reimbursement formulary. Under the 2011 AMNOG Reforms, price negotiations should be concluded within 180 days after a G-BA resolution. After discussion with the OIT, it was assumed that the date of medicine's implementation is 180 days after the G-BA has made a resolution for the medicine. Data source: G-BA website	France does not have a national reimbursement formulary. A medicine is reimbursed (i.e. listed) when a declaration is made in the Journal Officiel de la Republique Française. Dates are not readily discernable. According to the ISPOR website "the duration of the procedure (from reimbursement application to publication of reimbursement in the Official Journal) is in principle 90 days for hospital only drugs and 180 days for retail pharmacist drugs: for the latter, however, in 2007 the average was 282 days (not including generics – CEPS Rapport 2007)." Following discussion with the OIT, it has agreed that the date of a medicine's listing/implementation occurred 90 days after the date of the TC's opinion for the medicine. With this assumption, it is possible that a medicine's implementation could occur before the TC 's opinion for the medicine is published on-line. Data source: ISPOR website

			Cancer Drugs List despite not being recommended by NICE in its FAD, it has been assumed that the date of its implementation was 90 days after the date of the FAD. **Medicines not considered by NICE** For a medicine that has not been assessed and appraised by NICE and has been approved for the National Cancer Drugs List, the date of its implementation has been assumed to be 30 days after its registration by the European Commission. If the medicine was registered by the European Commission before the commencement of the National Cancer Drugs Fund, it has been assumed that its listing in the Fund occurred on 1 April 2011 (i.e. the date the Fund started).		

Since 2011, it has been possible to prepare and submit an application to the PBAC under the new TGA/PBAC parallel processes.

A submission to the PBAC can now be lodged at any time from the date of lodgement of a TGA registration dossier. Sponsors are permitted to submit the TGA Delegate's overview up to one week prior to the PBAC meeting (at the same time the pre-PBAC responses are provided to the PBAC Secretariat).

Data sources: PBS website (PBAC outcomes and PBAC Public Summary Documents) and OIT members

Results

The study sample is comprised of 19 first listings and 29 subsequent listings (Tables 2 & 3).

Table 2 – New listings

Medicine (generic name)	Medicine (brand name)	Disease/condition	Indication/patient population
Abiraterone acetate	Zytiga	Prostate cancer	Use in combination with prednisone or prednisolone in patients with metastatic advanced (castration-resistant) disease that has progressed following treatment with docetaxel
Afatinib dimaleate	Giotrif	Non small-cell lung cancer	Use as a first-line treatment of patients with locally advanced or metastatic (stage IIIB or IV) non-small cell lung cancer with activating mutation(s) of the epidermal growth factor receptor gene
Axitinib	Inlyta	Renal cell carcinoma	Patients with stage IV clear cell variant renal cell carcinoma
Bevacizumab	Avastin	Colorectal cancer	Use in combination with fluorouracil and calcium folinate or irinotecan hydrochloride trihydrate, fluorouracil and calcium folinate in previously untreated patients with metastatic disease
Cabazitaxel	Jevtana	Prostate cancer	Use in combination with prednisolone in patients with hormone refractory metastatic disease previously treated with a docetaxel-containing regimen
Crizotinib	Xalkori	Non small-cell lung cancer	Patients with anaplastic lymphoma kinase positive non-small cell lung cancer with disease progression following at least one platinum-based chemotherapy regimen
Dabrafenib mesylate	Tafinlar	Malignant melanoma	Patients with BRAF V600 mutation positive advanced (unresectable stage III) or metastatic (stage IV) melanoma
Degarelix acetate	Firmagon	Prostate cancer	Patients with locally advanced (stage C) or metastatic (stage D) disease
Eculizumab	Soliris	Paroxysmal nocturnal haemoglobinuria	Patients with symptomatic disease
Eribulin mesylate	Halaven	Breast cancer	Patients with locally advanced or metastatic breast cancer that has progressed after at least two chemotherapeutic regimens for advanced disease
Ipilimumab	Yervoy	Malignant melanoma	Patients with unresectable stage III or stage IV disease who have not responded to or were intolerant to prior systemic treatment for metastatic disease
Panitumumab	Vectibix	Colorectal cancer	Patients with K-RAS wild type metastatic disease after failure of treatment with 5-fluorouracil, irinotecan hydrochloride trihydrate and oxaliplatin
Pazopanib hydrochloride	Votrient	Renal cell carcinoma	Adult patients with stage IV advanced and/or metastatic clear cell variant disease who meet certain criteria
Ruxolitinib phosphate	Jakavi	Myelofibrosis	Treatment of disease-related symptoms in patients with intermediate or high-risk primary (idiopathic) myelofibrosis, post-polycythemia vera myelofibrosis or post-essential thrombocythemia myelofibrosis
Sorafenib tosylate	Nexavar	Liver cancer	Patients with advanced and unresectable disease

Medicine (generic name)	Medicine (brand name)	Disease/condition	Indication/patient population
Trastuzumab emtansine	Kadcyla	Breast cancer	Patients with HER2-positive unresectable locally advanced or metastatic breast cancer who have received prior therapy with trastuzumab and a taxane and whose disease has progressed despite treatment with trastuzumab for metastatic disease or within 6 months of completing adjuvant therapy
Vemurafenib	Zelboraf	Malignant melanoma	Previously untreated, unresectable stage IIIC or stage IV disease in patients positive for the serine/threonine-protein kinase B-raf (BRAF) V600 mutation, or alternatively BRAF V600 mutation with an Eastern Cooperative Oncology Group performance status of 0 or 1, who do not have progressive disease
Vinflunine ditartrate	Javlor	Transitional cell carcinoma	Adult patients with advanced or metastatic disease of the urothelial tract after failure of a prior platinum-containing regimen
Vorinostat	Zolinza	Non-Hodgkin's lymphoma	Patients with advanced (stage IIB-IV) cutaneous T cell lymphoma where treatment has failed with four systemic treatments

Table 3 – Subsequent listings

Medicine (generic name)	Medicine (brand name)	Disease/condition	Indication/patient population
Afatinib dimaleate	Giotrif	Non small-cell lung cancer	Use as a second or third-line treatment of patients with locally advanced or metastatic (stage IIIB or IV) non-small cell lung cancer with activating mutation(s) of the epidermal growth factor receptor gene
Aflibercept	Zaltrap	Colorectal cancer	Use in combination with an irinotecan-fluoropyrimidine-based chemotherapy by patients with metastatic colorectal cancer and a WHO performance status of 0 or 1 who have received previous treatment with an oxaliplatin-based chemotherapy regimen
Bevacizumab	Avastin	Brain cancer	Use as monotherapy in patients with relapsed or progressive disease
Bevacizumab	Avastin	Non small-cell lung cancer	Use in combination with carboplatin and paclitaxel in patients with advanced or metastatic non-squamous disease who meet certain criteria
Bevacizumab	Avastin	Ovarian cancer	Use in combination with paclitaxel and carboplatin for the treatment of patients with previously untreated advanced epithelial ovarian, fallopian tube or primary peritoneal cancer who are at high risk of disease recurrence
Bortezomib	Velcade	Multiple myeloma	Use in combination with a corticosteroid and melphalan or cyclophosphamide in patients with newly diagnosed symptomatic disease who are ineligible for high dose chemotherapy
Capecitabine	Xeloda	Gastric cancer	Use in combination with a platinum-based regimen in patients with previously untreated advanced disease
Cetuximab	Erbitux	Colorectal cancer	Use in combination with chemotherapy in patients with K-RAS wild type metastatic disease
Dasatinib monohydrate	Sprycel	Chronic myeloid leukaemia	Newly diagnosed patients in the chronic phase expressing the Philadelphia chromosome or the transcript, bcr-abl tyrosine kinase, and who have a primary diagnosis of chronic myeloid leukaemia
Eculizumab	Soliris	Haemolytic uraemic syndrome	Patients with atypical haemolytic uraemic syndrome
Erlotinib hydrochloride	Tarceva	Non small-cell lung cancer	Use as monotherapy for the treatment of patients with locally advanced (stage IIIB) or metastatic (stage IV) non-squamous or not otherwise specified non-small cell lung cancer with an activating mutation(s) of the epidermal growth factor receptor gene in tumour material
Everolimus	Afinitor	Renal cell carcinoma	Patients with progressive disease on sunitinib maleate or progressive disease following the cessation of treatment with sunitinib maleate due to toxicity and meet certain criteria
Everolimus	Afinitor	Pancreatic neuroendocrine tumour	Patients with unresectable or metastatic well or moderately differentiated disease who meet certain criteria
Everolimus	Afinitor	Tuberous sclerosis complex	Patients with visceral manifestations of tuberous sclerosis complex

Medicine (generic name)	Medicine (brand name)	Disease/condition	Indication/patient population
Everolimus	Afinitor	Breast cancer	Use in combination with exemestane for the treatment of post-menopausal women with hormone-receptor positive, HER2 negative advanced breast cancer after the failure of treatment with letrozole or anastrozole
Gefinitib	Iressa	Non small-cell lung cancer	Initial and continuing first-line treatment of patients with locally advanced or metastatic (stage IIIB or IV) non-small cell lung cancer with activating mutation(s) of the epidermal growth factor receptor gene in tumour material
Imatinib mesylate	Glivec	Gastrointestinal stromal tumour	Use as adjuvant treatment for 3 years in patients at high risk of recurrence following the complete resection of primary tumour who meet certain criteria
Lenalidomide	Revlimid	Myelodysplastic syndrome	Patients with low or intermediate-1 grade disease who have a 5q cytogenetic abnormality and are red blood cell transfusion dependent
Nilotinib hydrochloride monohydrate	Tasigna	Chronic myeloid leukaemia	Newly diagnosed patients in the chronic phase expressing the Philadelphia chromosome or the transcript, bcr-abl tyrosine kinase, and who have a primary diagnosis of chronic myeloid leukaemia
Panitumumab	Vectibix	Colorectal cancer	Use in combination with 5-fluorouracil, calcium folinate and oxaliplatin in patients with untreated K-RAS wild type metastatic disease in whom the use of bevacizumab is unsuitable
Pazopanib hydrochloride	Votrient	Sarcoma	Patients with advanced (unresectable and/or metastatic) soft tissue sarcoma
Pemetrexed disodium heptahydrate	Alimta	Non small-cell lung cancer	Use in combination with cisplatin in patients with locally advanced or metastatic disease with non-squamous cell histology (adenocarcinoma and/or large cell carcinoma)
Rituximab	MabThera	Chronic lymphocytic leukaemia	Use in combination with chemotherapy in patients with CD20 positive disease
Sorafenib tosylate	Nexavar	Renal cell carcinoma	Initial and continuing treatment of patients with advanced disease who meet certain criteria
Sunitinib maleate	Sutent	Pancreatic neuroendocrine tumour	Patients with unresectable, well-differentiated tumours that are unsuitable for cytotoxic chemotherapy
Topotecan hydrochloride	Hycamtin	Small cell lung cancer	Patients with relapsed disease where intravenous treatment is inappropriate
Trastuzumab	Herceptin	Gastric cancer	Use in combination with cisplatin and capecitabine or fluorouracil in patients with advanced, human epidermal growth factor receptor 2 positive advanced (equivalent to stage III or IV) adenocarcinoma of the stomach or gastro-oesophageal junction who have not received prior treatment for advanced disease
Trastuzumab	Herceptin	Breast cancer	Use in combination with neoadjuvant chemotherapy in patients with human epidermal growth factor receptor-2 positive early or locally advanced disease
Vinorelbine tartrate	Navelbine	Breast cancer	Use as monotherapy or in combination with other anti-neoplastic treatments in patients with advanced disease after the failure of standard treatment that includes an anthracycline

Australia

The results for Australia for the 19 new listings are presented in Table 4.

Six (32%) new listings were assessed under the new TGA/PBAC parallel processes. 12 (63%) have been recommended by the PBAC. Interestingly, 11 (92%) of the 12 new listings recommended by the PBAC were associated with a price reduction and 6 (50%) were associated with a risk share agreement.

The results for Australia for the 29 subsequent listings are presented in Table 5.

Three (10%) subsequent listings were assessed under the new TGA/PBAC parallel processes. 18 (62%) have been recommended by the PBAC. 10 (56%) of the 18 medicines recommended by the PBAC were associated with a price reduction and 8 (44%) were associated with a risk share agreement.

Table 4 – New listings (Australia)

Medicine (generic name)	Medicine (brand name)	Cancer Type	ARTG Start Date	PBAC Decision Date	PBAC Announcement Date	Most Recent PBAC Outcome	TGA/PBAC Parallel Process (Yes/No)	Risk Share Agreement**	Price Reduction**	Actual Listing Date	Number of Submissions
Abiraterone acetate	Zytiga	Prostate	1/03/2012	9/11/2012	21/12/2012	Recommendation	Yes	Yes	Yes	1/08/2013	4
Afatinib dimaleate	Giotrif	Non small-cell lung	7/11/2013	Not available***	Not available	Recommendation	Yes	Yes	Yes	Not listed	2
Axitinib	Inlyta	Renal cell	12/02/2013	7/11/2013	20/12/2013	Rejection	No	–	–	Not listed	1
Bevacizumab	Avastin	Colorectal	24/02/2005	11/07/2008	22/08/2008	Recommendation	No	Yes	Yes	1/07/2009	2
Cabazitaxel	Jevtana	Prostate	8/12/2011	9/03/2012	20/04/2012	Recommendation	Yes	Yes	Yes	1/08/2012	3
Crizotinib	Xalkori	Non small-cell lung	27/09/2013	7/11/2013	20/12/2013	Deferral	No	–	–	Not listed	1
Dabrafenib mesylate	Tafinlar	Melanoma	27/08/2013	12/07/2013	23/08/2013	Recommendation	Yes	Yes	Yes	1/12/2013	2
Degarelix acetate	Firmagon	Prostate	16/02/2010	9/07/2010	20/08/2010	Recommendation	No	–	–	1/12/2010	1
Eculizumab	Soliris	Haemoglobulinuria	20/03/2009	13/08/2010	24/09/2013	Recommendation	No	Unknown	Yes	1/01/2011	4
Eribulin mesylate	Halaven	Breast	4/09/2012	7/11/2013	20/12/2013	Recommendation	No	Unknown	Yes	Not listed	1
Ipilimumab	Yervoy	Melanoma	4/07/2011	9/11/2012	21/12/2012	Recommendation	Yes	Yes	Yes	1/08/2013	3
Panitumumab	Vectibix	Colorectal	14/05/2008	15/03/2013	29/04/2013	Recommendation	No	–	Yes	Not listed	2
Pazopanib hydrochloride	Votrient	Renal cell	30/06/2010	9/03/2012	20/04/2012	Recommendation	No	–	Yes	1/10/2012	2
Ruxolitinib phosphate	Jakavi	Myelofibrosis	3/07/2013	12/07/2013	23/08/2013	Rejection	Yes	–	–	Not listed	1
Sorafenib tosylate	Nexavar	Liver	25/02/2008*	11/07/2008	22/08/2008	Recommendation	No	–	Yes	1/02/2009	1
Trastuzumab emtansine	Kadcyla	Breast	3/09/2013	7/11/2013	20/12/2013	Rejection	No	–	–	Not listed	1
Vemurafenib	Zelboraf	Melanoma	10/05/2012	15/03/2013	29/04/2013	Deferral	No	Not applicable	Not applicable	Not listed	2
Vinflunine ditartrate	Javlor	Urinary tract	22/02/2011	4/11/2011	16/12/2011	Rejection	No	Not applicable	Not applicable	Not listed	1
Vorinostat	Zolinza	Non-Hodgkin's lymphoma	17/12/2009	11/03/2011	22/04/2011	Rejection	No	Not applicable	Not applicable	Not listed	1

* Date of registration by the TGA; ** data set derived solely from information in the public domain and may be incomplete; *** the date of this 'out-of-session meeting is not in the public domain.

Table 5 – Subsequent listings (Australia)

Medicine (generic name)	Medicine (brand name)	Cancer Type	TGA Registration Date	PBAC Decision Date	PBAC Announcement Date	Most Recent PBAC Outcome	TGA/PBAC Parallel Process (Yes/No)	Risk Share Agreement*	Price Reduction*	Actual Listing Date	Number of Submissions
Afatinib dimaleate	Giotrif	Non small-cell lung	7/11/2013	12/07/2013	23/08/2013	Rejection	Yes	–	–	Not listed	1
Aflibercept	Zaltrap	Colorectal	5/03/2013	12/07/2013	23/08/2013	Rejection	No	–	–	Not listed	1
Bevacizumab	Avastin	Non small-cell lung	10/02/2010	5/11/2010	17/12/2010	Rejection	No	Not applicable	Not applicable	Not listed	1
Bevacizumab	Avastin	Brain	27/10/2010	11/03/2011	22/04/2011	Rejection	No	Not applicable	Not applicable	Not listed	1
Bevacizumab	Avastin	Ovarian	Not available	7/11/2013	20/12/2013	Recommendation	Unknown	–	Yes	Not listed	1
Bortezomib	Velcade	Multiple myeloma	29/01/2009	10/07/2009	21/08/2009	Recommendation	No	–	Yes	1/11/2009	1
Capecitabine	Xeloda	Gastric	27/02/2009	12/03/2010	23/04/2010	Recommendation	No	–	–	1/08/2010	2
Cetuximab	Erbitux	Colorectal	4/02/2005	9/07/2010	20/08/2010	Recommendation	No	Yes	Yes	1/09/2011	8
Dasatinib monohydrate	Sprycel	Chronic myeloid leukaemia	28/04/2011	8/07/2011	19/08/2011	Recommendation	No	–	Yes	1/04/2012	1
Eculizumab	Soliris	Haemolytic uraemic syndrome	22/11/2012	15/03/2013	29/04/2013	Rejection	No	Not applicable	Not applicable	Not listed	1
Erlotinib hydrochloride	Tarceva	Non small-cell lung	10/07/2012	Not available**	Not available	Recommendation	No	Yes	Yes	1/01/2014	3
Everolimus	Afinitor	Renal cell	29/07/2009	4/11/2011	16/12/2011	Rejection	No	Not applicable	Not applicable	Not listed	4
Everolimus	Afinitor	Pancreatic	10/07/2012	9/11/2012	21/12/2012	Rejection	No	Not applicable	Not applicable	Not listed	1
Everolimus	Afinitor	Tuberous sclerosis complex	16/01/2012	15/04/2013	27/05/2013	Recommendation	No	Yes	Yes	1/12/2013	3
Everolimus	Afinitor	Breast	25/02/2013	Not available	Not available	Recommendation		Yes	Yes	Not listed	3
Gefinitib	Iressa	Non small-cell lung	29/06/2010	Not available**	Not available	Recommendation	No	Yes	Yes	1/01/2014	4
Imatinib mesylate	Glivec	Gastro-intestinal stromal	30/10/2012	9/11/2012	21/12/2012	Recommendation	Yes	Unknown	Yes	1/12/2013	2

Medicine (generic name)	Medicine (brand name)	Cancer Type	TGA Registration Date	PBAC Decision Date	PBAC Announcement Date	Most Recent PBAC Outcome	TGA/PBAC Parallel Process (Yes/No)	Risk Share Agreement*	Price Reduction*	Actual Listing Date	Number of Submissions
Lenalidomide	Revlimid	Myelodysplastic syndrome	15/04/2010	15/03/2010	29/04/2010	Recommendation	No	Yes	–	1/10/2013	3
Nilotinib hydrochloride monohydrate	Tasigna	Chronic myeloid leukaemia	26/08/2011	8/07/2011	19/08/2011	Recommendation	No	Yes	–	1/04/2012	1
Panitumumab	Vectibix	Colorectal	14/05/2008	15/03/2013	29/04/2013	Rejection	No	Not applicable	Not applicable	Not listed	1
Pazopanib hydrochloride	Votrient	Sarcoma	20/11/2012	12/07/2013	23/08/2013	Recommendation	No	–	–	Not listed	2
Pemetrexed disodium heptahydrate	Alimta	Non small-cell lung	22/09/2008	13/03/2009	24/04/2009	Recommendation	No	–	–	Not listed	1
Rituximab	MabThera	Chronic lymphocytic leukaemia	8/01/2010	15/12/2010	26/01/2011	Recommendation	No	–	–	1/12/2011	3
Sorafenib tosylate	Nexavar	Renal cell	25/09/2006	9/11/2012	21/12/2012	Rejection	No	Not applicable	Not applicable	Not listed	3
Sunitinib maleate	Sutent	Pancreatic	24/02/2011	Not available	Not available	Recommendation	No	Unknown	Unknown	1/12/2013	4
Topotecan hydrochloride	Hycamtin	Small cell lung	20/08/2009	9/07/2010	20/08/2010	Rejection	No	Not applicable	Not applicable	Not listed	1
Trastuzumab	Herceptin	Gastric	17/09/2010	9/11/2012	21/12/2012	Deferral	No	Yes	Yes	Not listed	2
Trastuzumab	Herceptin	Breast	29/06/2012	13/07/2012	17/08/2012	Recommendation	No	–	–	1/12/2012	1
Vinorelbine tartrate	Navelbine	Breast	21/12/2011	15/03/2013	29/04/2013	Recommendation	No	–	–	1/08/2013	2

* Data set derived solely from information in the public domain and may be incomplete; ** the date of this 'out-of-session meeting' is not in the public domain.

Tables 6 & 7 present the results on the number of submissions required to obtain a PBAC recommendation.

Table 6 – Number of submissions required to obtain a PBAC recommendation (first listings)

Submission attempt	Medicine (generic name)
1	Degarelix acetate, sorafenib tosylate
2	Abiraterone acetate*, afatinib dimaleate, bevacizumab, dabrafenib mesylate, eribulin mesylate, panitumumab, pazopanib hydrochloride
3	Cabazitaxel, ipilimumab
4	Eculizumab

* Further submissions were made

The average number of submissions required to achieve a recommendation (irrespective of whether or not it was deemed to be acceptable to the applicant/sponsor) was 2.3.

Table 7 – Number of submissions required to obtain a PBAC recommendation (subsequent listings)

Submission attempt	Medicine (generic name)
1	Bevacizumab, bortezomib, dasatinib monohydrate, nilotinib hydrochloride monohydrate, pemetrexed disodium heptahydrate, trastuzumab
2	Capecitabine, imatinib mesylate (GIST), pazopanib hydrochloride, vinorelbine tartrate
3	Erlotinib hydrochloride, everolimus (TSC), everolimus (BC), lenalidomide, rituximab
4	Gefitinib, sunitinib maleate
5	Nil
6	Nil
7	Nil
8	Cetuximab

The average number of submissions required to achieve a recommendation (irrespective of whether or not it was deemed to be acceptable to the applicant/sponsor) was 2.5.

Canada

The results for Canada for the 19 new listings are presented in Table 8. All listings were current as at 3 February 2014.

Only ten of the 19 new listings have been assessed by the pERC under the new Pan Canadian Oncology Drug Review process; nine (90%) have been recommended, the other medicine is still under review. Seven of the nine recommendations included a statement regarding the need for a price reduction for the medicine in question in order to justify its acceptable cost effectiveness.

Eleven of the 19 medicines have been listed in the British Colombia Cancer Care Drug Benefit List at various restriction levels.

The results for Canada for the 29 subsequent listings are presented in Table 9.

Only six of the 29 subsequent listings have been assessed by the pERC under the new Pan Canadian Oncology Drug Review process; three have been recommended, one was rejected and the remaining two are still under assessment. All three recommendations included a statement regarding the need for a price reduction for the medicine in question in order to justify its acceptable cost effectiveness.

21 of the 29 subsequent listings have been listed in the British Colombia Cancer Care Drug Benefit List at various restriction levels.

Table 8 – New listings (Canada)

Medicine (generic name)	Medicine (brand name)	Cancer Type	Health Canada Registration Date	pERC Reconsideration Meeting Date	pERC Final Recommendation Date	Most Recent pERC Outcome	Price Reduction	Cancer Care Ontario Drug Formulary Listing Date	British Columbia Cancer Agency Drug Benefit Listing Date	Listed in British Columbia Cancer Agency Drug Benefit List (as at 3 February 2014)*
Abiraterone acetate	Zytiga	Prostate	27/07/2011	Not available	Not available	No outcome	Not applicable	Not available	Not available	Listed (restricted)
Afatinib dimaleate	Giotrif	Non small-cell lung	1/11/2013	Not available	Not available	Pending	Unknown	Not available	Not available	Not listed
Axitinib	Inlyta	Renal cell	12/07/2012	21/02/2013	7/03/2013	Recommendation	No	17/12/2013	Under negotiation	Not listed
Bevacizumab	Avastin	Colorectal	9/09/2005	Not available	Not available	No outcome	Not applicable	Not available	Not available	Listed (restricted)
Cabazitaxel	Jevtana	Prostate	7/09/2011	Not available	Not available	No outcome	Not applicable	Not available	Not available	Listed (restricted)
Crizotinib	Xalkori	Non small-cell lung	25/04/2012	18/04/2013	2/05/2013	Recommendation	Yes	1/10/2013	Under negotiation	Not listed
Dabrafenib mesylate	Tafinlar	Melanoma	16/07/2013	21/11/2013	5/12/2013	Recommendation	Yes	Under consideration	Under consideration	Not listed
Degarelix acetate	Firmagon	Prostate	16/12/2010	Not available	Not available	No outcome	Not applicable	Not available	Not available	Listed (Class I)
Eculizumab	Soliris	Haemoglobulinuria	22/07/2009	Not available	Not available	No outcome	Not applicable	Not available	Not available	Not listed
Eribulin mesylate	Halaven	Breast	14/12/2011	19/07/2012	2/08/2012	Recommendation	Yes	30/07/2013	1/01/2014	Listed (restricted)
Ipilimumab	Yervoy	Melanoma	1/02/2012	15/03/2012	18/04/2012	Recommendation	Yes	13/09/2012	1/11/2012	Listed (Restricted)
Panitumumab	Vectibix	Colorectal	18/12/2008	Not available	Not available	No outcome	Not applicable	Not available	Not available	Listed (Class II)
Pazopanib hydrochloride	Votrient	Renal cell	27/05/2010	15/08/2013	29/08/2013	Recommendation	No	17/12/2013	1/09/2011	Listed (Restricted)
Ruxolitinib phosphate	Jakavi	Myelofibrosis	19/06/2012	20/12/2012	14/01/2013	Recommendation	Yes	20/09/2012	1/11/2013	Listed (Restricted)
Sorafenib tosylate	Nexavar	Liver	4/02/2008	Not available	Not available	No outcome	Not applicable	Not available	Not available	Listed (Restricted)
Trastuzumab emtansine	Kadcyla	Breast	11/09/2013	19/12/2013	10/01/2014	Recommendation	Yes	Not available	Not available	Not listed
Vemurafenib	Zelboraf	Melanoma	15/02/2012	17/05/2012	1/06/2012	Recommendation	Yes	31/08/2012	1/10/2012	Listed (Restricted)

Medicine (generic name)	Medicine (brand name)	Cancer Type	Health Canada Registration Date	pERC Reconsideration Meeting Date	pERC Final Recommendation Date	Most Recent pERC Outcome	Price Reduction	Cancer Care Ontario Drug Formulary Listing Date	British Columbia Cancer Agency Drug Benefit Listing Date	Listed in British Columbia Cancer Agency Drug Benefit List (as at 3 February 2014)*
Vinflunine ditartrate	Javlor	Urinary tract	Not available	Not available	Not available	No outcome	Not applicable	Not available	Not available	Not listed
Vorinostat	Zolinza	Non-Hodgkin's lymphoma	18/01/2010	Not available	Not available	No outcome	Not applicable	Not available	Not available	Not listed

*Class I = Reimbursed for active cancer or approved treatment or approved indication only; Class II = Reimbursed for approved indications only. Completion of Class II Approval Form is necessary. In addition, where indicated, approval from Tumour Group Chair or delegate; Restricted = Reimbursed for approved indications only. Completion of the BCCA Compassionate Access Program Application (formerly Undesignated Indication Form) is necessary to provide the appropriate clinical information for each patient.

Table 9 – Subsequent listings (Canada)

Medicine (generic name)	Medicine (brand name)	Cancer Type	Health Canada Registration Date	pERC Reconsideration Meeting Date	pERC Final Recommendation Date	Most Recent pERC Outcome	Price Reduction	Ontario Drug Formulary Listing Date	British Columbia Cancer Agency Drug Benefit Listing Date	Listed in British Columbia Cancer Agency Drug Benefit List (as at 3 February 2014)*
Afatinib dimaleate	Giotrif	Non small-cell lung	1/11/2013	Not available	Not available	Pending	Unknown	Not available	Not available	Not listed
Aflibercept	Zaltrap	Colorectal	Not available	Not available	Not available	Pending	Unknown	Not available	Not available	Not listed
Bevacizumab	Avastin	Non small-cell lung	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Bevacizumab	Avastin	Brain	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Not listed
Bevacizumab	Avastin	Ovarian	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Not listed
Bortezomib	Velcade	Multiple myeloma	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Capecitabine	Xeloda	Gastric	Not available	Not assessed	Not assessed	Not assessed	Not applicable	15/12/2011	Not available	Listed (Class II)
Cetuximab	Erbitux	Colorectal	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class II)
Dasatinib monohydrate	Sprycel	Chronic myeloid leukaemia	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Eculizumab	Soliris	Haemolytic uraemic syndrome	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Not listed
Erlotinib hydrochloride	Tarceva	Non small-cell lung	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class II)
Everolimus	Afinitor	Renal cell	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Everolimus	Afinitor	Pancreatic	2/02/2012	16/08/2012	30/08/2012	Recommendation	Yes	8/01/2013	1/06/2011	Listed (Restricted)
Everolimus	Afinitor	Tuberous sclerosis complex	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Not listed
Everolimus	Afinitor	Breast	10/01/2013	21/02/2013	25/03/2013	Recommendation	Yes	8/11/2013	1/12/2013	Listed (Class II)

Medicine (generic name)	Medicine (brand name)	Cancer Type	Health Canada Registration Date	pERC Reconsideration Meeting Date	pERC Final Recommendation Date	Most Recent pERC Outcome	Price Reduction	Ontario Drug Formulary Listing Date	British Columbia Cancer Agency Drug Benefit Listing Date	Listed in British Columbia Cancer Agency Drug Benefit List (as at 3 February 2014)*
Gefinitib	Iressa	Non small-cell lung cancer	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Imatinib mesylate	Glivec	Gastro-intestinal stromal	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class II)
Lenalidomide	Revlimid	Myelodysplastic syndrome	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Nilotinib hydrochloride monohydrate	Tasigna	Chronic myeloid leukaemia	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Panitumumab	Vectibix	Colorectal	18/12/2008	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Not listed
Pazopanib hydrochloride	Votrient	Sarcoma	12/07/2012	15/11/2012	29/11/2012	Rejection	No	27/03/2013	Not funded	Not listed
Pemetrexed disodium heptahydrate	Alimta	Non small-cell lung	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Rituximab	MabThera	Chronic lymphocytic leukaemia	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class II)
Sorafenib tosylate	Nexavar	Renal cell	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Sunitinib maleate	Sutent	Pancreatic	Not available	19/04/2012	3/05/2012	Recommendation	Yes	19/09/2013	1/06/2011	Listed (Restricted)
Topotecan hydrochloride	Hycamtin	Small cell lung	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class II)

Medicine (generic name)	Medicine (brand name)	Cancer Type	Health Canada Registration Date	pERC Reconsideration Meeting Date	pERC Final Recommendation Date	Most Recent pERC Outcome	Price Reduction	Ontario Drug Formulary Listing Date	British Columbia Cancer Agency Drug Benefit Listing Date	Listed in British Columbia Cancer Agency Drug Benefit List (as at 3 February 2014)*
Trastuzumab	Herceptin	Gastric	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Restricted)
Trastuzumab	Herceptin	Breast	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class II)
Vinorelbine tartrate	Navelbine	Breast	Not available	Not assessed	Not assessed	Not assessed	Not applicable	Not available	Not available	Listed (Class I)

*Class I = Reimbursed for active cancer or approved treatment or approved indication only.

*Class II = Reimbursed for approved indications only. Completion of Class II Approval Form is necessary. In addition, where indicated, approval from Tumour Group Chair or delegate.

*Restricted = Reimbursed for approved indications only. Completion of the BCCA Compassionate Access Program Application (formerly Undesignated Indication Form) is necessary to provide the appropriate clinical information for each patient.

England

The results for England for the 19 new listings are presented in Table 10. All listings were current as at 3 February 2014 (the current Cancer Drugs Fund List is dated 3 February 2014).

Eleven of the 19 new listings have been assessed by NICE; three (27%) were recommended and the remaining eight (73%) were not recommended. The draft guidance for all three did not recommend use on the National Health Service. In the end, all three final recommendations were associated with a Patient Access Scheme.

Of the 16 new listings either not recommended or not assessed by NICE, eight have been listed in the UK Cancer Drugs Fund and the remaining eight are not listed. One of the nine unlisted new listings is not registered for use.

The results for England for the 29 subsequent listings are presented in Table 11.

Sixteen of the 29 subsequent listings have been assessed by NICE; ten (63%) were recommended and the remaining six (37%) were not recommended. Four of the ten recommendations were associated with a Patient Access Scheme.

Of the 19 subsequent listings either not recommended or not assessed by NICE, nine have been listed in the UK Cancer Drugs Fund, two are not approved for use and the remaining eight are not listed.

Table 10 – New listings (England)

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	NICE Outcome (ACD)	NICE FAD Date	Most Recent NICE Outcome	Patient Access Scheme	UK Cancer Fund	Date of Implementation (as at 3 February 2014)
Abiraterone acetate	Zytiga	Prostate	5/09/2011	Not recommended	27/06/2012	Recommended	Yes	Not applicable	25/09/2012
Afatinib dimaleate	Giotrif	Non small-cell lung	25/09/2013	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Axitinib	Inlyta	Renal cell	3/09/2012	Not assessed	Not available	Not assessed	Not applicable	Listed	3/10/2012
Bevacizumab	Avastin	Colorectal	12/01/2005	Not recommended	24/01/2007	Not recommended	Not applicable	Listed	1/04/2011
Cabazitaxel	Jevtana	Prostate	17/03/2011	Not recommended	11/05/2012	Not recommended	Not applicable	Listed	9/08/2012
Crizotinib	Xalkori	Non small-cell lung	23/10/2012	Not recommended	25/09/2013	Not recommended	Not applicable	Listed	21/11/2012
Dabrafenib mesylate	Tafinlar	Melanoma	26/08/2013	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Degarelix acetate	Firmagon	Prostate	17/02/2009	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Eculizumab	Soliris	Haemoglobulinuria	20/06/2007	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Eribulin mesylate	Halaven	Breast	17/03/2011	Not recommended	3/04/2012	Not recommended	Not applicable	Listed	2/07/2012
Ipilimumab	Yervoy	Melanoma	13/07/2011	Not recommended	12/12/2012	Recommended	Yes	Not applicable	12/03/2013
Panitumumab	Vectibix	Colorectal	3/12/2007	Not recommended	25/01/2012	Not recommended	Not applicable	Not listed	Not available
Pazopanib hydrochloride	Votrient	Renal cell	14/06/2010	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Ruxolitinib phosphate	Jakavi	Myelofibrosis	23/08/2012	Not recommended	26/06/2013	Not recommended	Not applicable	Listed	24/09/2013
Sorafenib tosylate	Nexavar	Liver	29/10/2007	Not recommended	26/05/2010	Not recommended	Not applicable	Listed	1/04/2011
Trastuzumab emtansine	Kadcyla	Breast	15/11/2013	Not assessed	Not available	Not assessed	Not applicable	Listed	3/02/2014
Vemurafenib	Zelboraf	Melanoma	17/02/2012	Not recommended	12/12/2012	Recommended	Yes	Not applicable	12/03/2013

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	NICE Outcome (ACD)	NICE FAD Date	Most Recent NICE Outcome	Patient Access Scheme	UK Cancer Fund	Date of Implementation (as at 3 February 2014)
Vinflunine ditartrate	Javlor	Urinary tract	21/09/2009	Not recommended	23/01/2013	Not recommended	Not applicable	Not listed	Not available
Vorinostat	Zolinza	Non-Hodgkin's lymphoma	Not registered	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available

Table 11 – Subsequent listings (England)

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	NICE Outcome (ACD)	NICE FAD Date	Most Recent NICE Outcome	Patient Access Scheme	UK Cancer Fund	Date of Implementation (as at 3 February 2014)
Afatinib dimaleate	Giotrif	Non small-cell lung	25/09/2013	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Aflibercept	Zaltrap	Colorectal	1/02/2013	Not assessed	Not available	Not assessed	Not applicable	Listed	3/03/2013
Bevacizumab	Avastin	Non small-cell lung	Not registered	Not assessed	Not available	Not assessed	Not applicable	Not approved	Not available
Bevacizumab	Avastin	Brain	21/08/2007	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Bevacizumab	Avastin	Ovarian	19/12/2011	Not recommended	22/05/2013	Not recommended	Not applicable	Listed	18/01/2012
Bortezomib	Velcade	Multiple myeloma	29/08/2008	Recommended	27/07/2011	Recommended	No	Not applicable	25/10/2011
Capecitabine	Xeloda	Gastric	28/03/2007	Not available	28/07/2010	Recommended	No	Not applicable	26/10/2010
Cetuximab	Erbitux	Colorectal	17/07/2008	Not recommended	26/08/2009	Recommended	Yes	Not applicable	26/10/2010
Dasatinib monohydrate	Sprycel	Chronic myeloid leukaemia	6/12/2010	Not recommended	25/04/2012	Not recommended	Not applicable	Listed	24/07/2012
Eculizumab	Soliris	Haemolytic uraemic syndrome	24/11/2011	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Erlotinib hydrochloride	Tarceva	Non small-cell lung	24/08/2011	Not recommended	27/06/2011	Recommended	Yes	Not applicable	25/09/2012
Everolimus	Afinitor	Renal cell	3/08/2009	Not recommended	27/04/2011	Not recommended	Not applicable	Listed	26/07/2011
Everolimus	Afinitor	Pancreatic	24/08/2011	Not assessed	Not available	Not assessed	Not applicable	Listed	23/09/2011
Everolimus	Afinitor	Tuberous sclerosis complex	2/09/2011	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Everolimus	Afinitor	Breast	23/07/2012	Not recommended	28/08/2013	Not recommended	Not applicable	Listed	22/08/2012
Gefinitib	Iressa	Non small cell lung	24/06/2009	Not Recommended	28/07/2010	Recommended	Yes	Not applicable	26/10/2010

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	NICE Outcome (ACD)	NICE FAD Date	Most Recent NICE Outcome	Patient Access Scheme	UK Cancer Fund	Date of Implementation (as at 3 February 2014)
Imatinib mesylate	Glivec	Gastro-intestinal stromal	21/02/2012	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Lenalidomide	Revlimid	Myelodysplastic syndrome	13/06/2013	Not assessed	Not available	Not assessed	Not applicable	Listed	13/07/2013
Nilotinib hydrochloride monohydrate	Tasigna	Chronic myeloid leukaemia	20/12/2010	Recommended	25/04/2012	Recommended	Yes	Not applicable	24/07/2012
Panitumumab	Vectibix	Colorectal	10/11/2011	Not recommended	25/01/2012	Not recommended	Not applicable	Not approved	Not available
Pazopanib hydrochloride	Votrient	Sarcoma	3/08/2012	Not assessed	Not available	Not assessed	Not applicable	Listed	2/09/2012
Pemetrexed disodium heptahydrate	Alimta	Non small-cell lung	8/04/2008	Not recommended	23/09/2009	Recommended	No	Not applicable	22/12/2009
Rituximab	MabThera	Chronic lymphocytic leukaemia	21/08/2009	Recommended	28/07/2010	Recommended	No	Not applicable	26/10/2010
Sorafenib tosylate	Nexavar	Renal cell	19/07/2006	Not recommended	26/08/2009	Not recommended	Not applicable	Not listed	Not available
Sunitinib maleate	Sutent	Pancreatic	29/11/2010	Not assessed	Not available	Not assessed	Not applicable	Listed	1/04/2011
Topotecan hydrochloride	Hycamtin	Small cell lung	13/01/2006	Recommended	25/11/2009	Recommended	No	Not applicable	23/02/2010
Trastuzumab	Herceptin	Gastric	19/01/2010	Not recommended	24/11/2010	Recommended	No	Not applicable	22/02/2011
Trastuzumab	Herceptin	Breast	19/12/2011	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available
Vinorelbine tartrate	Navelbine	Breast	30/05/2008	Not assessed	Not available	Not assessed	Not applicable	Not listed	Not available

Germany

The results for Germany for the 19 new listings are presented in Table 12. All listings were current as at 3 February 2014.

Seven of the 19 new listings have been assessed by IQWiG and the G-BA; four of the seven have been deemed by the G-BA to have a significant added benefit, two are associated with a minor added benefit and one has been deemed to have no additional benefit.

The results for Germany for the 29 subsequent listings are presented in Table 13.

Only one of the 29 subsequent listings has been assessed by the IQWiG/G-BA.

Table 12 – New listings (Germany)

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	IQWiG Report Date	IQWiG Outcome (Benefit Assessment)	G-BA Report Date	G-BA Outcome (Benefit Assessment)	Date of Implementation (as at 3 February 2014)
Abiraterone acetate	Zytiga	Prostate	5/09/2011	29/12/2011	Significant benefit (indication)	29/03/2012	Significant benefit (indication)	25/09/2012
Afatinib dimaleate	Giotrif	Non small-cell lung	25/09/2013	Not assessed	Not applicable	Not assessed	Not applicable	Not listed
Axitinib	Inlyta	Renal cell	3/09/2012	21/11/2012	Significant benefit (hint)	21/03/2013	Minor added benefit (indication)	17/09/2013
Bevacizumab	Avastin	Colorectal	12/01/2005	Not assessed	Not applicable	Not assessed	Not applicable	Not listed
Cabazitaxel	Jevtana	Prostate	17/03/2011	12/01/2012	Significant benefit (indication)	29/03/2012	Minor added benefit (indication)	25/09/2012
Crizotinib	Xalkori	Non small-cell lung	23/10/2012	15/04/2013	No additional benefit	Not available	Not available	Not listed
Dabrafenib mesylate	Tafinlar	Melanoma	26/08/2013	23/12/2013	No additional benefit	Not available	Not applicable	Not listed
Degarelix acetate	Firmagon	Prostate	17/02/2009	Not assessed	Not applicable	Not assessed	Not applicable	18/05/2009
Eculizumab	Soliris	Haemoglobulinuria	20/06/2007	Not assessed	Not applicable	Not assessed	Not applicable	18/09/2007
Eribulin mesylate	Halaven	Breast	17/03/2011	30/01/2012	Benefit not quantifiable (indication)	19/04/2012	Minor added benefit (hint)	16/10/2012
Ipilimumab	Yervoy	Melanoma	13/07/2011	27/04/2012	Significant benefit (indication)	2/08/2012	Significant benefit (indication)	29/01/2013
Panitumumab	Vectibix	Colorectal	3/12/2007	Not assessed	Not applicable	Not assessed	Not applicable	2/03/2008
Pazopanib hydrochloride	Votrient	Renal cell	14/06/2010	Not assessed	Not applicable	Not assessed	Not applicable	12/09/2010
Ruxolitinib phosphate	Jakavi	Myelofibrosis	23/08/2012	10/12/2012	Not assessed*	7/03/2013	Minor added benefit	3/09/2013
Sorafenib tosylate	Nexavar	Liver	29/10/2007	Not assessed	Not applicable	Not assessed	Not applicable	27/01/2008
Trastuzumab emtansine	Kadcyla	Breast	15/11/2013	Under assessment	Not available	Not available	Not available	Not listed

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	IQWiG Report Date	IQWiG Outcome (Benefit Assessment)	G-BA Report Date	G-BA Outcome (Benefit Assessment)	Date of Implementation (as at 3 February 2014)
Vemurafenib	Zelboraf	Melanoma	17/02/2012	13/06/2012	Significant benefit (indication)	6/09/2012	Significant benefit (indication)	5/03/2013
Vinflunine ditartrate	Javlor	Urinary tract	21/09/2009	Not assessed	Not applicable	Not assessed	Not applicable	20/12/2009
Vorinostat	Zolinza	Non-Hodgkin's lymphoma	Not registered	Not assessed	Not applicable	Not assessed	Not applicable	Not listed

* Orphan drug.

Table 13 – Subsequent listings (Germany)

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	IQWiG Report Date	IQWiG Outcome (Benefit Assessment)	G-BA Report Date	G-BA Outcome (Benefit Assessment)	Date of Implementation (as at 3 February 2014)
Afatinib dimaleate	Giotrif	Non small-cell lung	25/09/2013	Not assessed	Not assessed	Not assessed	Not assessed	Not listed
Aflibercept	Zaltrap	Colorectal	1/02/2013	29/05/2013	Minor additional benefit (hint)	15/08/2013	Minor added benefit (indication)	Not listed
Bevacizumab	Avastin	Non small-cell lung	Not registered	Not available	Not available	Not available	Not available	Not listed
Bevacizumab	Avastin	Brain	21/08/2007	Not assessed	Not assessed	Not assessed	Not assessed	19/11/2007
Bevacizumab	Avastin	Ovarian	19/12/2011	Not assessed	Not assessed	Not assessed	Not assessed	18/03/2012
Bortezomib	Velcade	Multiple myeloma	29/08/2008	Not assessed	Not assessed	Not assessed	Not assessed	27/11/2008
Capecitabine	Xeloda	Gastric	28/03/2007	Not assessed	Not assessed	Not assessed	Not assessed	26/06/2008
Cetuximab	Erbitux	Colorectal	17/07/2008	Not assessed	Not assessed	Not assessed	Not assessed	15/10/2008
Dasatinib monohydrate	Sprycel	Chronic myeloid leukaemia	6/12/2010	Not assessed	Not assessed	Not assessed	Not assessed	6/03/2011
Eculizumab	Soliris	Haemolytic uraemic syndrome	24/11/2011	Not assessed	Not assessed	Not assessed	Not assessed	22/02/2012
Erlotinib hydrochloride	Tarceva	Non small-cell lung	24/08/2011	Not assessed	Not assessed	Not assessed	Not assessed	22/11/2011
Everolimus	Afinitor	Renal cell	3/08/2009	Not assessed	Not assessed	Not assessed	Not assessed	1/11/2009
Everolimus	Afinitor	Pancreatic	24/08/2011	Not assessed	Not assessed	Not assessed	Not assessed	22/11/2011
Everolimus	Afinitor	Tuberous sclerosis complex	2/09/2011	Not assessed	Not assessed	Not assessed	Not assessed	1/12/2011
Everolimus	Afinitor	Breast	23/07/2012	Not assessed	Not assessed	Not assessed	Not assessed	21/10/2012

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	IQWiG Report Date	IQWiG Outcome (Benefit Assessment)	G-BA Report Date	G-BA Outcome (Benefit Assessment)	Date of Implementation (as at 3 February 2014)
Gefinitib	Iressa	Non small cell lung cancer	24/06/2009	Not assessed	Not assessed	Not assessed	Not assessed	22/09/2009
Imatinib mesylate	Glivec	Gastro-intestinal stromal	21/02/2012	Not assessed	Not assessed	Not assessed	Not assessed	21/05/2012
Lenalidomide	Revlimid	Myelodysplastic syndrome	13/06/2013	Not assessed	Not assessed	Not assessed	Not assessed	11/09/2013
Nilotinib hydrochloride monohydrate	Tasigna	Chronic myeloid leukaemia	20/12/2010	Not assessed	Not assessed	Not assessed	Not assessed	20/03/2011
Panitumumab	Vectibix	Colorectal	10/11/2011	Not assessed	Not assessed	Not assessed	Not assessed	8/02/2012
Pazopanib hydrochloride	Votrient	Sarcoma	3/08/2012	Not assessed	Not assessed	Not assessed	Not assessed	1/11/2012
Pemetrexed disodium heptahydrate	Alimta	Non small-cell lung	8/04/2008	Not assessed	Not assessed	Not assessed	Not assessed	7/07/2008
Rituximab	MabThera	Chronic lymphocytic leukaemia	21/08/2009	Not assessed	Not assessed	Not assessed	Not assessed	19/11/2009
Sorafenib tosylate	Nexavar	Renal cell	19/07/2006	Not assessed	Not assessed	Not assessed	Not assessed	17/10/2006
Sunitinib maleate	Sutent	Pancreatic	29/11/2010	Not assessed	Not assessed	Not assessed	Not assessed	27/02/2011
Topotecan hydrochloride	Hycamtin	Small cell lung	13/01/2006	Not assessed	Not assessed	Not assessed	Not assessed	13/04/2006
Trastuzumab	Herceptin	Gastric	19/01/2010	Not assessed	Not assessed	Not assessed	Not assessed	19/04/2010
Trastuzumab	Herceptin	Breast	19/12/2011	Not assessed	Not assessed	Not assessed	Not assessed	18/03/2012
Vinorelbine tartrate	Navelbine	Breast	30/05/2008	Not assessed	Not assessed	Not assessed	Not assessed	28/02/2008

France

The results for France for the 19 new listings are presented in Table 14. All listings were current as at 3 February 2014.

15 (79%) of the 19 new listings have been assessed by TC. 13 of the 15 new listings were given an SMR rating of 'important', one a rating of 'moderate' and one a rating of 'insufficient.' With regard to the ASMR ratings, two were given a rating of II, five a rating of III, four a rating of IV and three a rating of V.

The results for France for the 29 subsequent listings are presented in Table 15.

24 (83%) of the 29 subsequent listings have been assessed by the TC. 22 of the 24 new listings were given an SMR rating of 'important', one a rating of 'moderate' and one a rating of 'low.' With regard to the ASMR ratings, three were given a rating of II, one a rating of III, ten a rating of IV and nine a rating of V.

Table 14 – New listings (France)

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	Date of TC Opinion	Date of Publication of TC Opinion On-Line*	SMR	ASMR	Date of implementation (as at 3 February 2014)
Abiraterone acetate	Zytiga	Prostate	5/09/2011	29/02/2012	21/05/2013	Important	III	29/05/2012
Afatinib dimaleate	Giotrif	Non small-cell lung	25/09/2013	Not assessed	Not available	Not available	Not available	Not available
Axitinib	Inlyta	Renal cell	3/09/2012	9/01/2013	21/05/2013	Important	IV	9/04/2013
Bevacizumab	Avastin	Colorectal	12/01/2005	8/06/2005	8/06/2005	Important	II	6/09/2005
Cabazitaxel	Jevtana	Prostate	17/03/2011	17/10/2012	19/10/2012	Important	III	15/01/2013
Crizotinib	Xalkori	Non small-cell lung	23/10/2012	3/04/2013	10/07/2013	Important	III	2/07/2013
Dabrafenib mesylate	Tafinlar	Melanoma	26/08/2013	Not assessed	Not available	Not available	Not available	Not available
Degarelix acetate	Firmagon	Prostate	17/02/2009	23/09/2009	8/02/2011	Important	V	22/12/2009
Eculizumab	Soliris	Haemoglobulinuria	20/06/2007	24/10/2007	24/10/2007	Important	II	22/01/2008
Eribulin mesylate	Halaven	Breast	17/03/2011	20/07/2011	20/07/2011	Important	IV	18/10/2011
Ipilimumab	Yervoy	Melanoma	13/07/2011	14/12/2011	14/12/2011	Important	IV	13/03/2012
Panitumumab	Vectibix	Colorectal	3/12/2007	30/04/2008	17/11/2009	Important	V	29/07/2008
Pazopanib hydrochloride	Votrient	Renal cell	14/06/2010	2/02/2011	4/06/2012	Insufficient	Not available	Not available
Ruxolitinib phosphate	Jakavi	Myelofibrosis	23/08/2012	9/01/2013	21/05/2013	Important	III	
Sorafenib tosylate	Nexavar	Liver	29/10/2007	5/03/2008	22/06/2009	Important	IV	3/06/2008
Trastuzumab emtansine	Kadcyla	Breast	15/11/2013	Not assessed	Not available	Not available	Not available	Not available
Vemurafenib	Zelboraf	Melanoma	17/02/2012	20/02/2012	12/09/2013	Important	III	20/05/2012

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	Date of TC Opinion	Date of Publication of TC Opinion On-Line*	SMR	ASMR	Date of implementation (as at 3 February 2014)
Vinflunine ditartrate	Javlor	Urinary tract	21/09/2009	16/12/2009	14/04/2011	Moderate	V	16/03/2010
Vorinostat	Zolinza	Non-Hodgkin's lymphoma	Not registered	Not assessed	Not available	Not available	Not available	Not available

* It is unclear if this date signifies the publication of the French or English language version.

Table 15 – Subsequent listings (France)

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	Date of TC Opinion	Date of Publication of TC Opinion On-Line*	SMR	ASMR	Date of Implementation (as at 3 February 2014)
Afatinib dimaleate	Giotrif	Non small-cell lung	25/09/2013	Not available	Not available	Not available	Not available	Not listed
Aflibercept	Zaltrap	Colorectal	1/02/2013	24/07/2013	12/09/2013	Important	V	22/10/2013
Bevacizumab	Avastin	Non small-cell lung	Not registered	Not available	Not available	Not available	Not available	Not listed
Bevacizumab	Avastin	Brain	21/08/2007	21/08/2007	1/08/2008	Important	V	19/11/2007
Bevacizumab	Avastin	Ovarian	19/12/2011	5/12/2012	18/01/2013	Important	IV	5/03/2013
Bortezomib	Velcade	Multiple myeloma	29/08/2008	10/06/2009	4/06/2012	Important	III	8/09/2009
Capecitabine	Xeloda	Gastric	28/03/2007	6/02/2009	24/07/2009	Important	V	6/05/2008
Cetuximab	Erbitux	Colorectal	17/07/2008	13/05/2009	16/05/2009	Important	V	11/08/2009
Dasatinib monohydrate	Sprycel	Chronic myeloid leukaemia	6/12/2010	Not assessed	Not available	Not available	Not available	Not listed
Eculizumab	Soliris	Haemolytic uraemic syndrome	24/11/2011	19/09/2012	3/04/2013	Important	II	18/12/2012
Erlotinib hydrochloride	Tarceva	Non small-cell lung	24/08/2011	6/06/2012	6/06/2012	Important	IV	4/09/2012
Everolimus	Afinitor	Renal cell	3/08/2009	13/10/2010	22/12/2009	Important	IV	11/01/2011
Everolimus	Afinitor	Pancreatic	24/08/2011	28/03/2012	28/03/2012	Important	IV	26/06/2012
Everolimus	Afinitor	Tuberous sclerosis complex	2/09/2011	4/01/2012	4/01/2012	Important	II	3/04/2012
Everolimus	Afinitor	Breast	23/07/2012	3/04/2013	15/07/2013	Low	V	2/07/2013
Gefinitib	Iressa	Non small cell lung	24/06/2009	4/11/2009	10/11/2009	Important	IV	2/02/2010
Imatinib mesylate	Glivec	Gastro-intestinal stromal	21/02/2012	Not assessed	Not available	Not available	Not available	Not listed

Medicine (generic name)	Medicine (brand name)	Cancer Type	European Commission Registration Date	Date of TC Opinion	Date of Publication of TC Opinion On-Line*	SMR	ASMR	Date of Implementation (as at 3 February 2014)
Lenalidomide	Revlimid	Myelodysplastic syndrome	13/06/2013	Not assessed	Not available	Not available	Not available	Not listed
Nilotinib hydrochloride monohydrate	Tasigna	Chronic myeloid leukaemia	20/12/2010	6/04/2011	6/04/2011	Important	IV	5/07/2011
Panitumumab	Vectibix	Colorectal	10/11/2011	17/10/2012	11/04/2013	Important	V	15/01/2013
Pazopanib hydrochloride	Votrient	Sarcoma	3/08/2012	9/01/2013	21/05/2013	Important	IV	9/04/2013
Pemetrexed disodium heptahydrate	Alimta	Non small-cell lung	8/04/2008	26/11/2008	16/09/2009	Important	V	24/02/2009
Rituximab	MabThera	Chronic lymphocytic leukaemia	21/08/2009	27/01/2010	11/03/2011	Important	IV	27/04/2010
Sorafenib tosylate	Nexavar	Renal cell	19/07/2006	6/09/2006	6/09/2006	Important	II	5/12/2006
Sunitinib maleate	Sutent	Pancreatic	29/11/2010	21/09/2011	21/09/2011	Moderate	V	20/12/2011
Topotecan hydrochloride	Hycamtin	Small cell lung	13/01/2006	3/09/2008	3/11/2009	Important	IV	2/12/2008
Trastuzumab	Herceptin	Gastric	19/01/2010	16/02/2011	16/02/2011	Important	IV	17/05/2011
Trastuzumab	Herceptin	Breast	19/12/2011	9/01/2013	21/05/2013	Important	Not available	9/04/2013
Vinorelbine tartrate	Navelbine	Breast	30/05/2008	29/04/2009	17/05/2011	Important	V	28/07/2009

* It is unclear if this date signifies the publication of the French or English version.

International comparisons

The results for the international comparison for new listings are presented in Table 16 and for subsequent listings in Table 17.

The results need to be interpreted with caution given the small sample sizes in some jurisdictions, the use of multiple assumptions and the presence of negative values for some medicines in the time to event analyses.

Table 16 – International comparison for new listings

Attribute	Australia	Canada (ON)	Canada (BC)	England	Germany	France
Number assessed	19	9	9	11	7	15
Number (%) accepted/recommended*	12 (63%)	7 (78%)	5 (55%)	3 (27%)	6 (86%)	14 (93%)
Number listed/implemented	9	8**	11**	11**	9**	14
Time from registration to listing (days) (range)	589 (96-1588)	465 (198-734)	443 (229-749)	584 (30-2270)	378 (90-579)	256 (93-670)
Time from registration to listing (months) (range)	19.5 (3.2 to 52.5)	15.4 (6.5 to 24.3)	14.6 (7.6 to 24.8)	19.3 (1.0 to 75.0)	12.5 (3.0 to 19.1)	8.5 (3.1 to 22.1)
Time from acceptance/recommendation to listing (days) (range)	208 (141 to 355)	200 (91 to 362)	80 (-728 to 517)	230 (-327 to 1528)	180 (180 to 180)	90 (90 to 90)
Time from acceptance/recommendation to listing (months) (range)	6.9 (4.7 to 11.7)	6.6 (3.0 to 12.0)	2.6 (-24.1 to 17.1)	7.6 (-10.1 to 50.5)	6.0 (6.0 to 6.0)	3.0 (3.0 to 3.0)

* The number of medicines accepted or recommended/number of medicines assessed, where acceptance = recommended in Australia, Canada & England, G-BA resolution of at least a minor added benefit and an ASMR rating of V or better in France.

** In Canada, the number of medicines listed/implemented is greater than the number recommended by the pERC as some were listed in the provinces before the creation of the pCODR process. In England, the number of medicines listed/implemented is greater than the number of medicines that have been recommended by NICE because of the Cancer Drugs Fund List. In Germany, the number of medicines listed/implemented is greater than the number of medicines that have been assessed by the G-BA because some medicines were listed/implemented before the 2011 AMNOG reforms.

The results presented in Table 16 indicate that the PBAC recommendation rate for the new listings for patients with cancer was broadly comparable to the acceptance rates in Canada, lower than the 'recommendation' rates for the IQWiG in Germany and the TC in France and greater than the recommendation rate for NICE in England. Comparisons to Germany and France are less amenable due to differences in how the agencies in these countries express their determinations. While the mean time from registration to listing/implementation for new listings in Australia appears to be have been longer than most countries (except England), the mean time from acceptance/recommendation to listing/implementation in Australia was comparable to most other countries. Some of the comparisons need to be interpreted with caution due to the presence of negative values. (Negative values are the result of some medicines being listed before they were accepted/recommended).

Table 17 – International comparisons for subsequent listings

Attribute	Australia	Canada (ON)	Canada (BC)	England	Germany	France
Number assessed	29	3	3	15	1	24
Number (%) accepted/recommended*	18 (62%)	3 (100%)	3 (100%)	4 (29%)	Assessment is on-going	24 (100%)
Number listed/implemented	14	4**	3**	18**	25**	22
Time from registration to listing (days) (range)	741 (155 to to 2400)	300 (258 to 341)	40 (-246 to 325)	474 (30 to 1502)	90 (90 to 90)	365 (90 to 1054)
Time from registration to listing (months) (range)	24.5 (5.1 to 79.3)	9.9 (8.5 to 11.3)	1.3 (-8.1 to 10.7)	15.7 (1.0 to 49.7)	3.0 (3.0 to 3.0)	12.1 (3.0 to 34.8)

Time from acceptance/recommendation to listing (days) (range)	242 (114 to 419)	251 (118 to 504)***	-181 (-456 to 251)***	90 (90 to 90)	Not applicable	90 (90 to 90)
Time from acceptance/recommendation to listing (months) (range)	8.0 (3.8 to 13.9)	8.3 (3.9 to 16.7)	-6.0 (15.1 to 8.3)	3.0 (3.0 to 3.0)	Not applicable	3.0 (3.0 to 3.0)

* The number of medicines accepted or recommended/number of medicines assessed, where acceptance = recommended in Australia, Canada & England, G-BA resolution of at least a minor added benefit and an ASMR rating of V or better in France.

** In Canada, the number of medicines listed/implemented is greater than the number recommended by the pERC as some were listed in the provinces before the creation of the pCODR process. In England, the number of medicines listed/implemented is greater than the number of medicines that have been recommended by NICE because of the Cancer Drugs Fund List. In Germany, the number of medicines listed/implemented is greater than the number of medicines that have been assessed by the G-BA because some medicines were listed/implemented before the 2011 AMNOG reforms.

*** These medicines were registered and reimbursed before the introduction of the pCODR process.

The results presented in Table 17 suggest that the PBAC recommendation rate for subsequent listings for patients with cancer was lower than the 'recommendation' rates in Canada and France and greater than the recommendation rate for NICE in England. While the mean time from registration to listing/implementation for subsequent listings in Australia appears to have been longer than most of the other countries, the mean time from acceptance/recommendation to listing/implementation in Australia was comparable to most other countries. Once again, the analysis is confounded by negative values.

The OIT is interested in determining access to new medicines for patients with the following cancers:

- Malignant melanoma (ipilimumab, dabrafenib mesylate, vemurafenib)
- Colorectal cancer (aflibercept, bevacizumab, cetuximab, panitumumab)
- Non small-cell lung cancer (afatinib dimaleate, bevacizumab, crizotinib, erlotinib hydrochloride, gefitinib, pemetrexed disodium heptahydrate)
- Breast cancer (eribulin mesylate, everolimus, trastuzumab, trastuzumab emtansine, vinorelbine tartate)

The results for the medicines for these cancer types are presented in Table 18.

Table 18 – International comparison for new medicines for patients with selected cancer types

	Australia	Canada*	England	Germany	France
Malignant melanoma					
Ipilimumab	Listed	Listed	Listed	Listed	Listed
Dabrafenib mesylate	Listed	Not listed	Not listed	Not listed	Not listed
Vemurafenib	Not listed	Listed	Listed (CDF)	Listed	Listed
Colorectal cancer					
Aflibercept	Not listed	Not listed	Listed (CDF)	Not listed	Listed
Bevacizumab (first-line)	Listed	Listed	Listed(CDF)	Listed**	Listed
Cetuximab	Listed	Listed	Listed	Listed**	Listed
Panitumumab (second-line)	Not listed	Listed	Not listed	Listed**	Listed
Panitumumab (first-line)	Not listed	Not listed	Not listed	Listed**	Listed
Non small-cell lung cancer					
Afatinib dimaleate	Not listed	Not listed	Not listed	Not listed	Not listed
Bevacizumab	Not listed	Not listed	Not listed	Listed**	Listed
Crizotinib	Not listed	Listed	Listed (CDF)	Not listed	Listed
Erlotinib hydrochloride	Listed	Listed	Listed	Listed**	Listed
Gefitinib (first-line)	Listed	Listed	Listed	Listed**	Listed
Pemetrexed disodium heptahydrate	Not listed	Listed	Listed	Listed**	Listed
Breast cancer					
Eribulin mesylate	Not listed	Not listed	Listed (CDF)	Listed	Listed
Everolimus	Not listed	Listed	Listed (CDF)	Listed**	Listed
Trastuzumab (neoadjuvant)	Listed	Listed	Not listed	Listed**	Listed
Trastuzumab emtansine	Not listed	Not listed	Listed (CDF)	Not listed	Not listed
Vinorelbine tartrate	Listed	Listed	Not listed	Listed**	Listed

* Ontario and/or British Colombia; ** Listed before the 2011 AMNOG Reforms; CDF = Cancer Drug Fund.

Access to new medicines for patients with colorectal cancer appears to be poorer in Australia with no subsidized access to aflibercept and panitumumab; the latter has been recommended by the PBAC for second-line use but remains unlisted. Access to new medicines for patients with non small-cell lung cancer also seems to be slightly poorer in Australia with no subsidized access to crizotinib, afatinib dimaleate and pemetrexed disodium heptahydrate; afatinib dimaleate and pemetrexed disodium heptahydrate have been recommended by the PBAC but have not been listed on the PBS as at 3 February 2014. Access to new medicines for patients with breast cancer also seems to be slightly poorer in Australia with no subsidized access to eribulin mesylate and everolimus; both were recently recommended by the PBAC so they may well be listed on the PBS soon.

Discussion

For the reasons stated above, the results from some analyses need to be interpreted with caution and it would be unwise to draw any firm conclusions. The current reimbursement systems for cancer medicines in the study countries are exactly not the same and assumptions were required to yield values for the time to event analyses for England, Germany and France (see Tables 16 and 17). The sample sizes for some analyses are not large because of the recent reforms in Germany (new AMNOG process in 2011) and England (creation of the Cancer Drugs Fund in 2011) and the creation of a new assessment/appraisal process in Canada in late 2011 and the fact that some HTA agencies only assess/appraise 'selected' new cancer medicines. Australia's (cancer) medicine reimbursement system is more aligned to the (cancer) medicine reimbursement systems in England and Canada. It is interesting to note that England and the two largest provinces in Canada (Ontario and British Colombia) now have separate lists/formularies for cancer medicines.

Nonetheless, the results presented in Tables 16 & 17 suggest that the recommendation rates for new and subsequent listings for cancer in recent times in Australia are broadly comparable to the acceptance rates in Canada and are greater than the corresponding recommendation rates for NICE in England (until the establishment of the UK Cancer Drugs Fund which has led to a major improvement in access). The 'recommendation' rates for new and subsequent listings appear to be higher in France. The 'recommendation' rate for new listings in Germany also appears to be higher.

The results from the time to event analyses suggest while the mean times from registration to listing/implementation for new and subsequent listings in Australia appear to be longer than in Canada, the mean time from acceptance/recommendation to listing/implementation in Australia for new listings is comparable to Canada. The results for the subsequent listings for Canada are misleading as some medicines were listed before the creation of the new pCODR process. Comparisons with other countries are problematic given the number of assumptions required.

The time to event results for Australia present a very mixed picture with the time from registration to listing being long for some medicines (e.g. 1,588 days for bevacizumab for the first line treatment of metastatic colorectal cancer and 2,400 days for cetuximab also for colorectal cancer) and short for others (e.g. 96 days for dabrafenib mesylate for malignant melanoma).

The results presented in Tables 4, 5, 8, 9, 10 & 11 clearly indicate that a price reduction is almost always required to secure a recommendation and subsequent listing in Australia, Canada and England. In the case of Australia, the information regarding price reductions was sourced solely from the PBAC Public Summary Documents; it is possible that the prices of some other medicines in the study sample have been reduced and that this has not been made public. Price reductions were not confined to those medicines that were recommended.

Risk-share agreements are now in frequent use being associated with one in every two medicines recommended by the PBAC. This could be an underestimate, as some might not have been reported in the Public Summary Documents.

The results in Tables 6 & 7 indicate that more than one PBAC submission was invariably required to obtain a positive PBAC recommendation; the average number of submissions required to obtain a recommendation was 2.3 for new listings and 2.5 for subsequent listings. It is unclear if these results are any better or worse than for submissions for new/subsequent listings for non-cancer medicines.

The initial submission for six of the 19 new listings and three of the 29 subsequent listings was evaluated under the new TGA/PBAC parallel process. All nine submissions were rejected (Tables 4 & 5).

Whilst this study was not designed to evaluate the effects on the recent reforms in England, Germany and Canada on patient access to new cancer medicines, it is clear that the creation of the Cancer Drugs Fund in England in 2011 has improved access. Tables 16 & 17 show the Fund has improved the access to new listings from 3 to 11 and access to subsequent listings from 4 to 18.

The results from this study may well be sensitive to the study methods. The control groups for the study were those medicines that have been considered by the PBAC for listing on the PBS since 2008. Different results may have resulted if the control group was a collection of medicines that have been considered by a HTA agency in another country such as Germany or France for a given study period. At the time of the analysis, there were at least 12 new oncology medicines that had not been considered by the PBAC but had been considered by at least one HTA agency in the other four countries.

Furthermore, a study period spanning 2008 to 2013 was chosen in order to maximize the size of the study sample. The introduction of major reforms in Canada, Germany and England in 2011 underpins the shortcomings of a long study period insofar as medicine reimbursement systems are dynamic and are subject to frequent change by Governments. The results from this study might not predict the future as the reimbursement systems might undergo further reform.

Further analysis is required to explain any possible international differences. The introduction of the new TGA/PBAC parallel process in Australia is a potential confounder.

ABOUT THE AUTHOR

Michael Wonder

Wonder Drug Consulting Pty Ltd

PO Box 470, Cronulla NSW 2230 Australia

wonderdrug@optusnet.com.au

Michael Wonder completed a Bachelor of Science (Honours) degree in Biochemistry & Pathology from the University of Melbourne in 1982 and a Bachelor of Pharmacy degree from the Victorian College of Pharmacy in 1985. He joined the pharmaceutical industry in 1991 after working for five years as a hospital pharmacist at the Austin Hospital in Melbourne. In February 1997 he moved to Sydney to join the newly formed Novartis Pharmaceuticals Australia as the Health Economics Manager. In that role he was responsible for the strategic development and subsequent preparation of reimbursement &/or pricing submissions for new drugs/indications to the Pharmaceutical Benefits Advisory Committee (PBAC) and the Pharmaceutical Benefits Pricing Authority (PBPA) as well as the negotiation of the prices of new drugs with the PBPA. From August 2004 until January 2011, he was a Director, Global Pricing and Market Access Operations, Global Pricing and Market Access, Novartis Pharma AG, Basel Switzerland based in Sydney. In this role, Michael worked to ensure that the evidence needs of the major pricing and reimbursement agencies for the company's key development compounds are identified during their early development and built into the clinical development plans before the start of the Phase III clinical trials. Michael now works as a market access consultant to the local and international health care industry.