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New Drug Application (NDA): 021743

Company: OSI PHARMS

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Products on NDA 021743 ▼

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Drug Name	Active Ingredients	Strength	Dosage Form/Route	Marketing Status	RLD	TE Code
TARCEVA	ERLOTINIB HYDROCHLORIDE	EQ 25MG BASE	TABLET;ORAL	Prescription	Yes	None
TARCEVA	ERLOTINIB HYDROCHLORIDE	EQ 100MG BASE	TABLET;ORAL	Prescription	Yes	None
TARCEVA	ERLOTINIB HYDROCHLORIDE	EQ 150MG BASE	TABLET;ORAL	Prescription	Yes	None

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Approval Date(s) and History, Letters, Labels, Reviews for NDA 021743 ▼

Labels for NDA 021743**CSVExcelPrint**

Action Date	Submission	Submission Classification or Approval Type	Letters, Reviews, Labels, Patient Package Insert
10/18/2016	SUPPL-25	Efficacy	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/101825.pdf)
09/28/2016	SUPPL-26	Labeling	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/092826.pdf)
06/01/2016	SUPPL-27	Efficacy	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/060127.pdf)
05/20/2016	SUPPL-23	Efficacy	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/052023.pdf)
04/27/2015	SUPPL-21	Efficacy-Labeling Change With Clinical Data	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2015/042721.pdf)
04/14/2014	SUPPL-19	Labeling- Package Insert	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2014/041419.pdf)
05/14/2013	SUPPL-18	Efficacy-New Indication	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2013/051418.pdf)
04/17/2012	SUPPL-17	Labeling- Package Insert	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2012/041717.pdf)
04/16/2010	SUPPL-16	Efficacy-New Indication	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2010/041616.pdf)
04/16/2010	SUPPL-14	Labeling	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2010/041614.pdf)
04/27/2009	SUPPL-15	Labeling	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2009/042715.pdf)

Action Date	Submission	Submission Classification or Approval Type	Letters, Reviews, Labels, Patient Package Insert
09/19/2008	SUPPL-11	Efficacy-New Dosing Regimen	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2008/09/19/20080919suppl11.pdf)
09/12/2008	SUPPL-10	Labeling	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2008/09/12/20080912suppl10.pdf)
04/27/2007	SUPPL-7	Labeling	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2007/04/27/20070427suppl7.pdf)
11/02/2005	SUPPL-3	Efficacy-New Indication	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2005/11/02/20051102suppl3.pdf)
11/18/2004	ORIG-1	Approval	Label (PDF) (https://www.accessdata.fda.gov/drugsatfda_docs/label/2004/11/18/20041118orig1.pdf)

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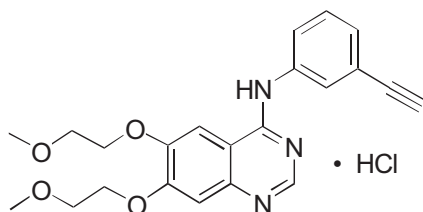
TARCEVA[®]
(erlotinib)

RX Only

Tablets

DESCRIPTION

TARCEVA (erlotinib) is a Human Epidermal Growth Factor Receptor Type 1/Epidermal Growth Factor Receptor (HER1/EGFR) tyrosine kinase inhibitor. Erlotinib is a quinazolinamine with the chemical name N-(3-ethynylphenyl)-6,7-bis(2-methoxyethoxy)-4-quinazolinamine. TARCEVA contains erlotinib as the hydrochloride salt that has the following structural formula:



Erlotinib hydrochloride has the molecular formula $C_{22}H_{23}N_3O_4 \cdot HCl$ and a molecular weight of 429.90. The molecule has a pK_a of 5.42 at 25°C. Erlotinib hydrochloride is very slightly soluble in water, slightly soluble in methanol and practically insoluble in acetonitrile, acetone, ethyl acetate and hexane.

Aqueous solubility of erlotinib hydrochloride is dependent on pH with increased solubility at a pH of less than 5 due to protonation of the secondary amine. Over the pH range of 1.4 to 9.6, maximal solubility of approximately 0.4 mg/mL occurs at a pH of approximately 2.

TARCEVA tablets are available in three dosage strengths containing erlotinib hydrochloride (27.3 mg, 109.3 mg and 163.9 mg) equivalent to 25 mg, 100 mg and 150 mg erlotinib and the following inactive ingredients: lactose monohydrate, hypromellose, hydroxypropyl cellulose, magnesium stearate, microcrystalline cellulose, sodium starch glycolate, sodium lauryl sulfate and titanium dioxide. The tablets also contain trace amounts of color additives, including FD&C Yellow #6 (25 mg only) for product identification.

CLINICAL PHARMACOLOGY

Mechanism of Action and Pharmacodynamics

The mechanism of clinical antitumor action of erlotinib is not fully characterized. Erlotinib inhibits the intracellular phosphorylation of tyrosine kinase associated with the epidermal growth factor receptor (EGFR). Specificity of inhibition with regard to other tyrosine kinase receptors has not been fully characterized. EGFR is expressed on the cell surface of normal cells and cancer cells.

Pharmacokinetics

Erlotinib is about 60% absorbed after oral administration and its bioavailability is substantially increased by food to almost 100%. Its half-life is about 36 hours and it is cleared predominantly by CYP3A4 metabolism and to a lesser extent by CYP1A2.

Absorption and Distribution

Bioavailability of erlotinib following a 150 mg oral dose of TARCEVA is about 60% and peak plasma levels occur 4 hrs after dosing. Food increases bioavailability substantially, to almost 100%.

Following absorption, erlotinib is approximately 93% protein bound to albumin and alpha-1 acid glycoprotein (AAG). Erlotinib has an apparent volume of distribution of 232 liters.

Metabolism and Elimination

In vitro assays of cytochrome P450 metabolism showed that erlotinib is metabolized primarily by CYP3A4 and to a lesser extent by CYP1A2, and the extrahepatic isoform CYP1A1. Following a 100 mg oral dose, 91% of the dose was recovered: 83% in feces (1% of the dose as intact parent) and 8% in urine (0.3% of the dose as intact parent).

A population pharmacokinetic analysis in 591 patients receiving single-agent TARCEVA showed a median half-life of 36.2 hours. Time to reach steady state plasma concentration would therefore be 7 – 8 days. No significant relationships of clearance to covariates of patient age, body weight or gender were observed. Smokers had a 24% higher rate of erlotinib clearance.

A second population pharmacokinetic analysis was conducted that incorporated erlotinib data from 204 pancreatic cancer patients who received erlotinib plus gemcitabine. This analysis demonstrated that covariates affecting erlotinib clearance in patients from the pancreatic study were very similar to those seen in the prior single-agent pharmacokinetic analysis. No new covariate effects were identified. Co-administration of gemcitabine had no effect on erlotinib plasma clearance.

Special Populations

Patients with Hepatic Impairment

Erlotinib is cleared predominantly by the liver. No data are currently available regarding the influence of hepatic dysfunction and/or hepatic metastases on the pharmacokinetics of erlotinib (see **PRECAUTIONS - Patients with Hepatic Impairment, ADVERSE REACTIONS** and **DOSAGE AND ADMINISTRATION - Dose Modifications** sections).

Patients with Renal Impairment

Less than 9% of a single dose is excreted in the urine. No clinical studies have been conducted in patients with compromised renal function.

Interactions

Erlotinib is metabolized predominantly by CYP3A4, and inhibitors of CYP3A4 would be expected to increase exposure. Co-treatment with the potent CYP3A4 inhibitor ketoconazole increased erlotinib AUC by 2/3 (see **PRECAUTIONS - Drug Interactions** and **DOSAGE AND ADMINISTRATION - Dose Modifications** sections).

Pre- or co-treatment with the CYP3A4 inducer rifampicin increased erlotinib clearance by 3-fold and reduced AUC by 2/3 (see **PRECAUTIONS - Drug Interactions** and **DOSAGE AND ADMINISTRATION - Dose Modifications** sections).

In a Phase Ib study, there were no significant effects of gemcitabine on the pharmacokinetics of erlotinib nor were there significant effects of erlotinib on the pharmacokinetics of gemcitabine.

CLINICAL STUDIES

Non-Small Cell Lung Cancer (NSCLC) – TARCEVA Administered as a Single Agent

The efficacy and safety of single-agent TARCEVA was assessed in a randomized, double blind, placebo-controlled trial in 731 patients with locally advanced or metastatic NSCLC after failure of at least one chemotherapy regimen. Patients were randomized 2:1 to receive TARCEVA 150 mg or placebo (488 Tarceva, 243 placebo) orally once daily until disease progression or unacceptable toxicity. Study endpoints included overall survival, response rate, and progression-free survival (PFS). Duration of response was also examined. The primary endpoint was survival. The study was conducted in 17 countries. About half the patients (326) had EGFR expression status characterized.

Table 1 summarizes the demographic and disease characteristics of the study population. Demographic characteristics were well balanced between the two treatment groups. About two-thirds of the patients were male. Approximately one-fourth had a baseline ECOG performance status (PS) of 2, and 9% had a baseline ECOG PS of 3. Fifty percent of the patients had received only one prior regimen of chemotherapy. About three quarters of these patients were known to have smoked at some time.

Table 1: Demographic and Disease Characteristics

Characteristics	TARCEVA (N = 488)		Placebo (N = 243)	
	n	(%)	n	(%)
Gender				
Female	173	(35)	83	(34)
Male	315	(65)	160	(66)
Age (years)				
< 65	299	(61)	153	(63)
≥ 65	189	(39)	90	(37)
Race				
Caucasian	379	(78)	188	(77)
Black	18	(4)	12	(5)
Asian	63	(13)	28	(12)

Other	28	(6)	15	(6)
ECOG Performance Status at Baseline*				
0	64	(13)	34	(14)
1	256	(52)	132	(54)
2	126	(26)	56	(23)
3	42	(9)	21	(9)
Weight Loss in Previous 6 Months				
< 5%	320	(66)	166	(68)
5 – 10%	96	(20)	36	(15)
> 10%	52	(11)	29	(12)
Unknown	20	(4)	12	(5)
Smoking History				
Never Smoked	104	(21)	42	(17)
Current or Ex-smoker	358	(73)	187	(77)
Unknown	26	(5)	14	(6)
Histological Classification				
Adenocarcinoma	246	(50)	119	(49)
Squamous	144	(30)	78	(32)
Undifferentiated Large Cell	41	(8)	23	(9)
Mixed Non-Small Cell	11	(2)	2	(<1)
Other	46	(9)	21	(9)
Time from Initial Diagnosis to Randomization (Months)				
< 6	63	(13)	34	(14)
6 – 12	157	(32)	85	(35)
> 12	268	(55)	124	(51)
Best Response to Prior Therapy at Baseline*				
CR/PR	196	(40)	96	(40)
PD	101	(21)	51	(21)
SD	191	(39)	96	(40)
Number of Prior Regimens at Baseline*				
1	243	(50)	121	(50)
2	238	(49)	119	(49)

3	7	(1)	3	(1)
Exposure to Prior Platinum at Baseline*				
Yes	454	(93)	224	(92)
No	34	(7)	19	(8)

* Stratification factor as documented at baseline; distribution differs slightly from values reported at time of randomization.

The results of the study are shown in Table 2.

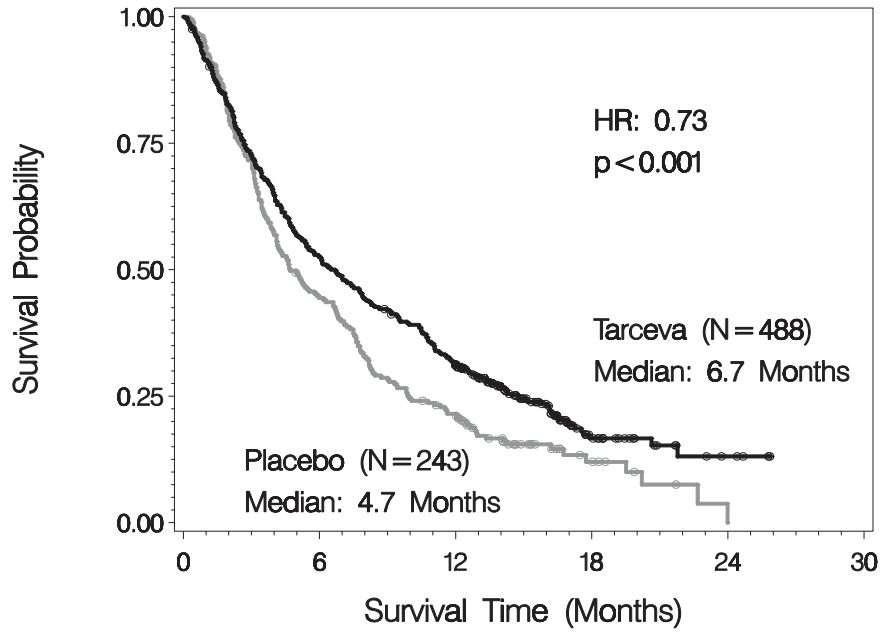
Table 2: Efficacy Results

	TARCEVA	Placebo	Hazard Ratio (1)	95% CI	p-value
Survival	Median 6.7 mo	Median 4.7 mo	0.73	0.61 – 0.86	<0.001 (2)
1-year Survival	31.2%	21.5%			
Progression-Free Survival	Median 9.9 wk	Median 7.9 wk	0.59	0.50 – 0.70	<0.001 (2)
Tumor Response (CR+PR)	8.9%	0.9%			<0.001 (3)
Response Duration	Median 34.3 wk	Median 15.9 wk			

- (1) Cox regression model with the following covariates: ECOG performance status, number of prior regimens, prior platinum, best response to prior chemotherapy.
- (2) Two-sided Log-Rank test stratified by ECOG performance status, number of prior regimens, prior platinum, best response to prior chemotherapy.
- (3) Two-sided Fisher's exact test

Survival was evaluated in the intent-to-treat population. Figure 1 depicts the Kaplan-Meier curves for overall survival. The primary survival and PFS analyses were two-sided Log-Rank tests stratified by ECOG performance status, number of prior regimens, prior platinum, best response to prior chemotherapy.

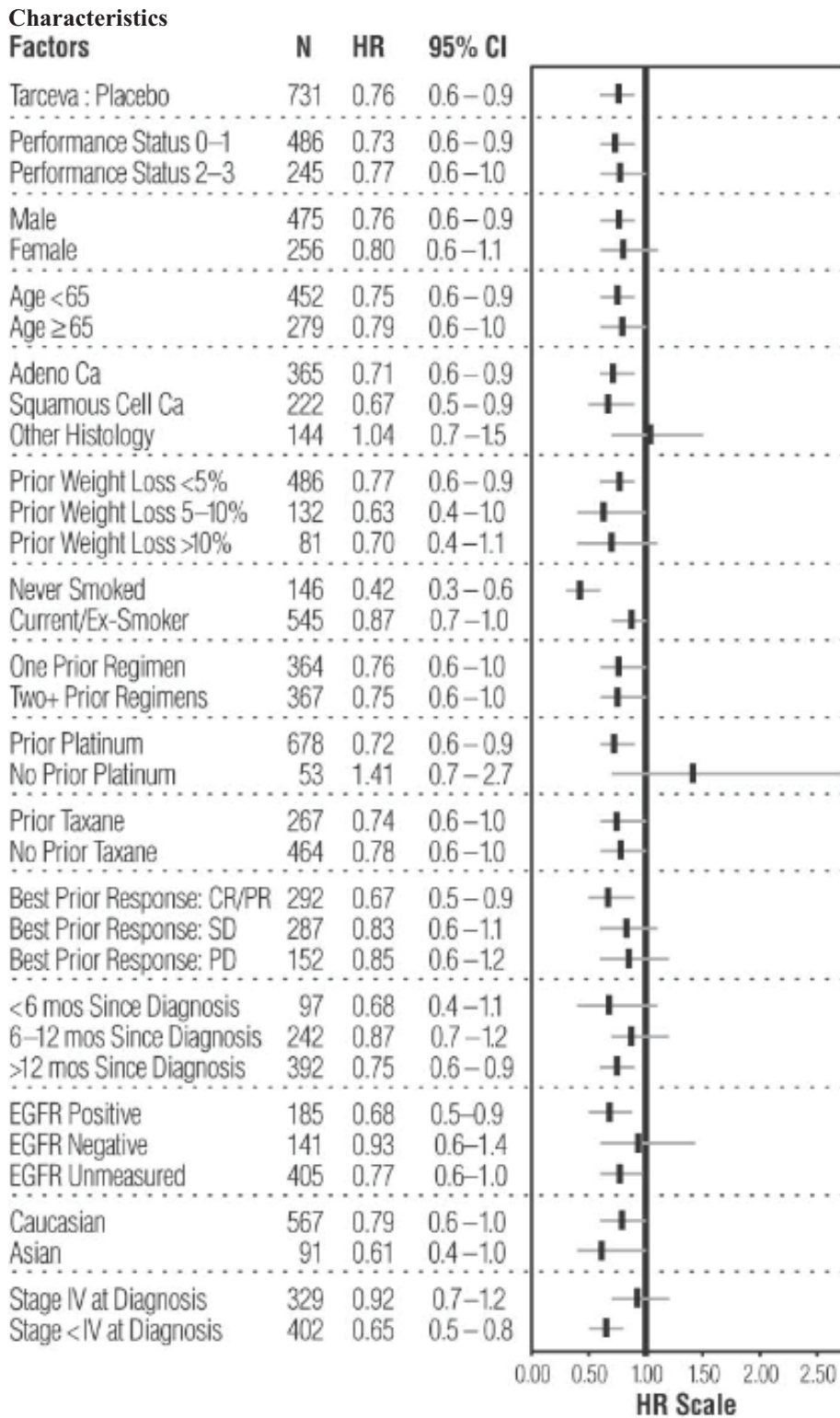
Figure 1: Kaplan–Meier Curve for Overall Survival of Patients by Treatment Group



Note: HR is from Cox regression model with the following covariates: ECOG performance status, number of prior regimens, prior platinum, best response to prior chemotherapy. P-value is from two-sided Log-Rank test stratified by ECOG performance status, number of prior regimens, prior platinum, best response to prior chemotherapy.

A series of subsets of patients were examined in exploratory univariate analyses. The results of these analyses are shown in Figure 2. The effect of TARCEVA on survival was similar across most subsets. An apparently larger effect, however, was observed in two subsets: patients with EGFR positive tumors (HR = 0.68) and patients who never smoked (HR = 0.42). These subsets are considered further below.

Figure 2: Survival Hazard Ratio (HR) (TARCEVA: Placebo) in Subgroups According to Pretreatment



Note: Depicted are the univariate hazard ratio (HR) for death in the TARCEVA patients relative to the placebo patients, the 95% confidence interval (CI) for the HR, and the sample size (N) in each subgroup. The hash mark on the horizontal bar represents the HR, and the length of the horizontal bar represents the 95% confidence interval. A hash mark to the left of the vertical line corresponds to a HR that is less than 1.00, which indicates that survival is better in the TARCEVA arm compared with the placebo arm in that subgroup.

Relation of Single-Agent TARCEVA Results in NSCLC to EGFR Protein Expression Status (as Determined by Immunohistochemistry)

Analysis of the impact of EGFR expression status on the treatment effect on clinical outcome is limited because EGFR status is known for 326 NSCLC study patients (45%). EGFR status was ascertained for patients who already had tissue samples prior to study enrollment. However, the survival in the EGFR tested population and the effects of single-agent TARCEVA were almost identical to that in the entire study population, suggesting that the tested population was a representative sample. A positive EGFR expression status was defined as having at least 10% of cells staining for EGFR in contrast to the 1% cut-off specified in the EGFR pharmDx™ kit instructions. The use of the pharmDx kit has not been validated for use in non-small cell lung cancer.

Single-agent TARCEVA prolonged survival in the EGFR positive subgroup (N = 185; HR = 0.68; 95% CI = 0.49 – 0.94) (Figure 3) and the subgroup whose EGFR status was unmeasured (N = 405; HR = 0.77; 95% CI = 0.61 – 0.98) (Figure 5), but did not appear to have an effect on survival in the EGFR negative subgroup (N = 141; HR = 0.93; 95% CI = 0.63 – 1.36) (Figure 4). However, the confidence intervals for the EGFR positive, negative and unmeasured subgroups of NSCLC patients are wide and overlap, so that a survival benefit due to TARCEVA in the EGFR negative subgroup cannot be excluded.

For the subgroup of NSCLC patients who never smoked, EGFR status also appeared to be predictive of TARCEVA survival benefit. Patients who never smoked and were EGFR positive had a large TARCEVA survival benefit (N = 41; HR = 0.28; 95% CI = 0.13 – 0.61). There were too few EGFR negative patients who never smoked to reach a conclusion.

Tumor responses were observed in all EGFR subgroups: 11.3% in the EGFR positive subgroup, 9.5% in the EGFR unmeasured subgroup and 3.8% in the EGFR negative subgroup. An improvement in progression free survival was demonstrated in the

EGFR positive subgroup (HR = 0.49; 95% CI = 0.35 – 0.68), the EGFR unmeasured subgroup (HR = 0.60; 95% CI = 0.47 – 0.75), and less certain in the EGFR negative subgroup (HR = 0.80; 95% CI = 0.55 – 1.16).

Figure 3: Survival in EGFR Positive Patients

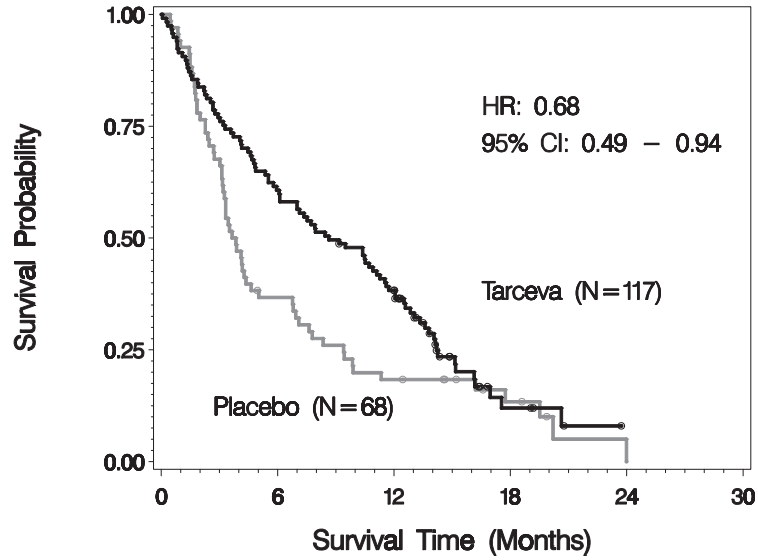


Figure 4: Survival in EGFR Negative Patients

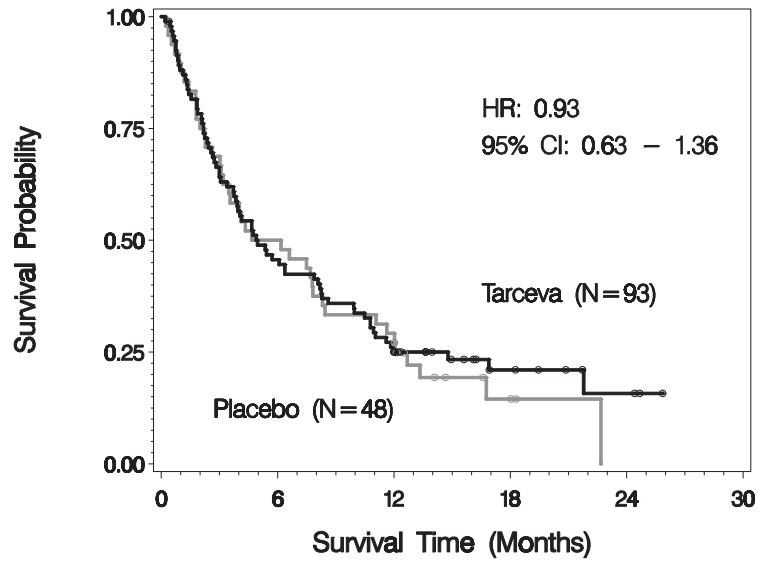
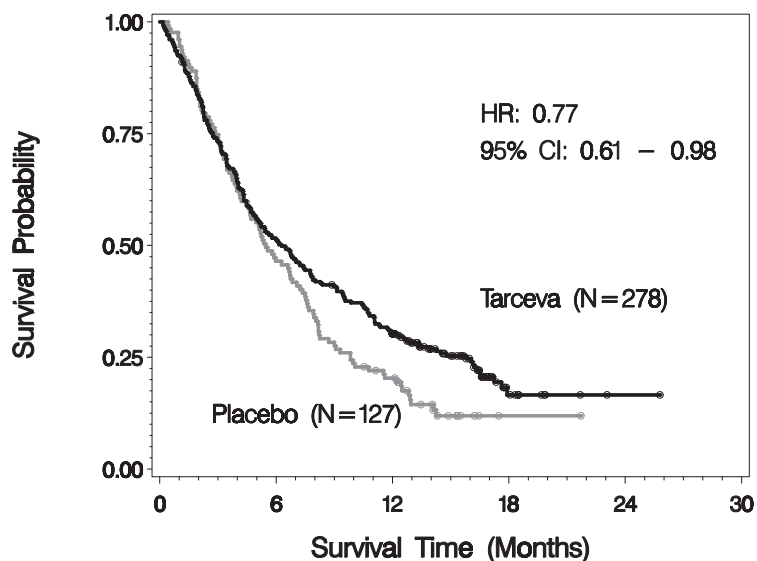


Figure 5: Survival in EGFR Unmeasured Patients



NSCLC - TARCEVA Administered Concurrently with Chemotherapy

Results from two, multicenter, placebo-controlled, randomized, trials in over 1000 patients conducted in first-line patients with locally advanced or metastatic NSCLC showed no clinical benefit with the concurrent administration of TARCEVA with platinum-based chemotherapy [carboplatin and paclitaxel (TARCEVA, N = 526) or gemcitabine and cisplatin (TARCEVA, N = 580)].

Pancreatic Cancer - TARCEVA Administered Concurrently with Gemcitabine

The efficacy and safety of TARCEVA in combination with gemcitabine as a first-line treatment was assessed in a randomized, double blind, placebo-controlled trial in 569 patients with locally advanced, unresectable or metastatic pancreatic cancer. Patients were randomized 1:1 to receive TARCEVA (100 mg or 150 mg) or placebo once daily on a continuous schedule plus gemcitabine IV (1000 mg/m², Cycle 1 - Days 1, 8, 15, 22, 29, 36 and 43 of an 8 week cycle; Cycle 2 and subsequent cycles - Days 1, 8 and 15 of a 4 week cycle [the approved dose and schedule for pancreatic cancer, see the gemcitabine package insert]). TARCEVA or placebo was taken orally once daily until disease progression or unacceptable toxicity. The primary endpoint was survival. Secondary endpoints included response rate, and progression-free survival (PFS). Duration of response and the role of EGFR tumor expression in survival were also examined. The study was conducted in 18 countries. A total of

285 patients were randomized to receive gemcitabine plus TARCEVA (261 patients in the 100 mg cohort and 24 patients in the 150 mg cohort) and 284 patients were randomized to receive gemcitabine plus placebo (260 patients in the 100 mg cohort and 24 patients in the 150 mg cohort). Too few patients were treated in the 150 mg cohort to draw conclusions.

Table 3 summarizes the demographic and disease characteristics of the study population that was randomized to receive 100 mg of TARCEVA plus gemcitabine or placebo plus gemcitabine. Baseline demographic and disease characteristics of the patients were similar between the 2 treatment groups, except for a slightly larger proportion of females in the TARCEVA arm (51%) compared with the placebo arm (44%). The median time from initial diagnosis to randomization was approximately 1.0 month. Most patients presented with metastatic disease at study entry as the initial manifestation of pancreatic cancer. About 1/4 of the patients (136/521) had EGFR expression status characterized.

Table 3: Demographic and Disease Characteristics: 100 mg Cohort

Characteristics	TARCEVA+ Gemcitabine (N=261)		Placebo + Gemcitabine (N=260)	
	n	(%)	n	(%)
Gender				
Female	134	(51)	114	(44)
Male	127	(49)	146	(56)
Age (Years)				
<65	136	(52)	138	(53)
≥65	125	(48)	122	(47)
Race				
Caucasian	225	(86)	231	(89)
Black	8	(3)	5	(2)
Asian	20	(8)	14	(5)
Other	8	(3)	10	(3)
ECOG Performance Status*				
0	82	(31)	83	(32)

Characteristics	TARCEVA+ Gemcitabine (N=261)		Placebo + Gemcitabine (N=260)	
	n	(%)	n	(%)
1	134	(51)	132	(51)
2	44	(17)	45	(17)
Unknown*	1	(<1)	0	(0)
Disease Status at Baseline**				
Locally Advanced	61	(23)	63	(24)
Distant Metastasis	200	(77)	197	(76)

*Unknown includes responses of 'Unknown' and missing.

**Stratification factor as documented at baseline; distribution differs slightly from values reported at time of randomization.

The results of the study are shown in Table 4.

Table 4: Efficacy Results: 100 mg Cohort

	TARCEVA + Gemcitabine	Placebo+ Gemcitabine	Hazard Ratio (1)	95% CI	p-value
Survival	Median 6.4 mo 250 deaths	Median 6.0 mo 254 deaths	0.81	0.68 – 0.97	0.028 (2)
1-year Survival	23.8%	19.4%			
Progression- Free Survival	Median 3.8 mo 225 events	Median 3.5 mo 232 events	0.76	0.64 – 0.92	0.006 (2)
Tumor Response (CR+PR)	8.6%	7.9%			0.87 (3)
Response Duration	Median 23.9 wk	Median 23.3 wk			

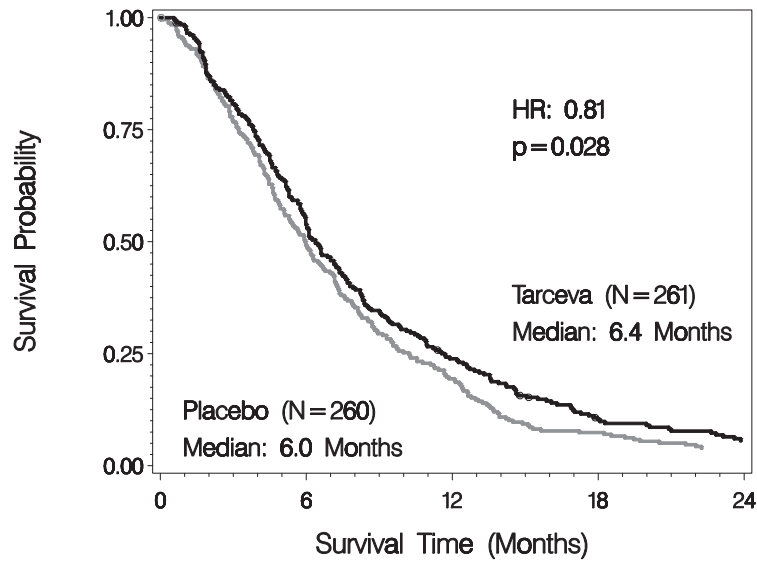
(1) Cox regression model with the following covariates: ECOG performance status, and extent of disease.

(2) Two-sided Log-Rank test stratified by ECOG performance status and extent of disease.

(3) Two-sided Fisher's exact test.

Survival was evaluated in the intent-to-treat population. Figure 6 depicts the Kaplan-Meier curves for overall survival in the 100 mg cohort. The primary survival and PFS analyses were two-sided Log-Rank tests stratified by ECOG performance status and extent of disease.

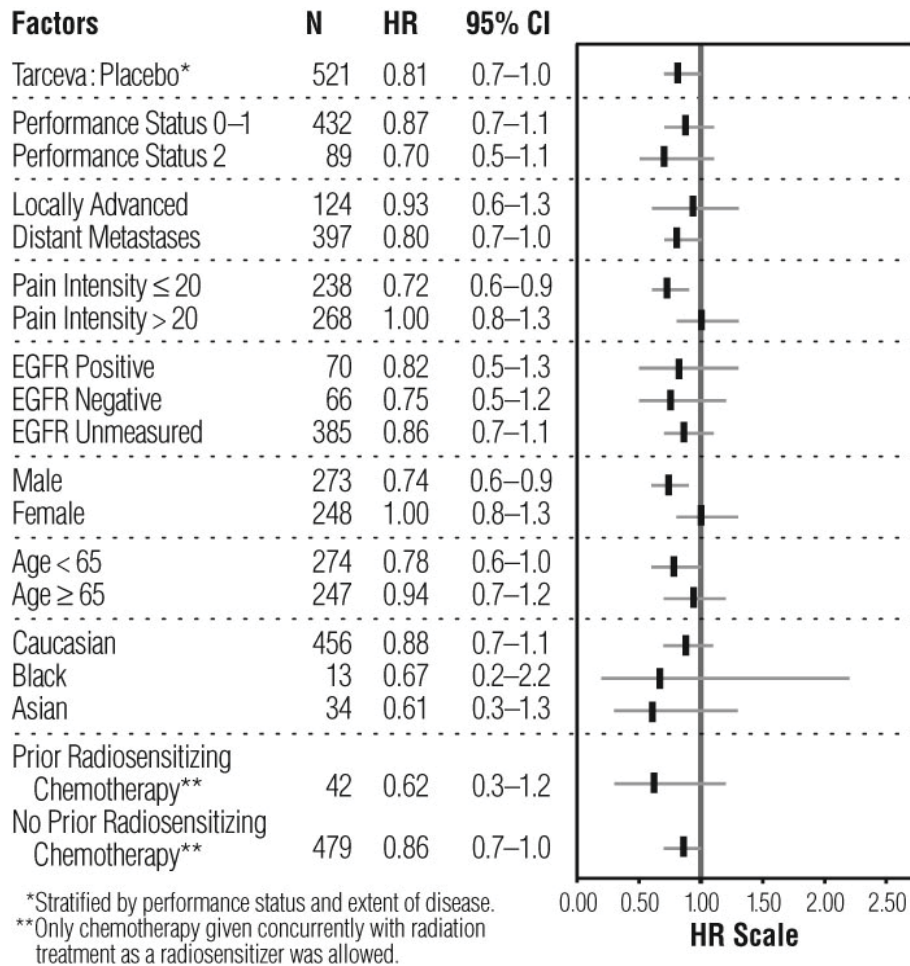
Figure 6: Kaplan–Meier Curve for Overall Survival: 100 mg Cohort



Note: HR is from Cox regression model with the following covariates: ECOG performance status and extent of disease. P-value is from two-sided Log-Rank test stratified by ECOG performance status and extent of disease.

In a series of exploratory univariate subset analyses (the stratification factors at randomization and at baseline, as well as pain intensity by visual analog score, EGFR status, gender, age, race, and any prior chemotherapy), all of the HRs in the TARCEVA plus gemcitabine arm relative to the placebo plus gemcitabine arm were less than or equal to 1.0 suggesting consistency across all patient subsets. However, in patients with pain intensity score >20, female, locally advanced, age ≥ 65 years, or performance status 0 or 1, the benefit of erlotinib was uncertain.

Figure 7: Survival Hazard Ratio (HR) (TARCEVA : Placebo) in Subgroups According to Pretreatment Characteristics: 100 mg Cohort



Note: Depicted are the univariate hazard ratio (HR) for death in the patients receiving TARCEVA plus gemcitabine relative to the patients receiving placebo plus gemcitabine, the 95% confidence interval (CI) for the HR, and the sample size (N) in each subgroup. The hash mark on the horizontal bar represents the HR, and the length of the horizontal bar represents the 95% confidence interval. A hash mark to the left of the vertical line corresponds to a HR that is less than 1.00, which indicates that survival is better in the TARCEVA arm compared with the placebo arm in that subgroup. Only chemotherapy given concurrently with radiation treatment as a radiosensitizer was allowed.

Relation of Pancreatic Cancer Trial Results to EGFR Protein Expression Status (as Determined by Immunohistochemistry)

Analysis of the impact of EGFR expression status on the treatment effect on clinical outcome is limited because EGFR status is known for only 136 study patients (26%) in the 100 mg cohort. There were no significant differences in patient or disease characteristics between the patients for whom results were known and the patients for whom the results were unknown, suggesting that the tested population was a representative sample. EGFR expression was determined using the EGFR pharmDx™ kit. In contrast to the 1% cut-off specified in the pharmDx kit instructions, a positive EGFR expression status was defined as having at least 10% of cells staining for EGFR. The pharmDx kit has not been validated for use in pancreatic cancer.

The survival results of TARCEVA plus gemcitabine compared to gemcitabine alone by EGFR status were as follows: EGFR positive subgroup (N = 70; HR = 0.82; 95% CI = 0.50 – 1.32) (Figure 8), EGFR negative subgroup (N = 66; HR = 0.75; 95% CI = 0.46 – 1.23) (Figure 9), and the subgroup whose EGFR status was unmeasured (N = 385; HR = 0.86; 95% CI = 0.70 – 1.05) (Figure 10). The confidence intervals for each subgroup are wide and overlapping and none of the p-values reached statistical significance.

Tumor responses were observed in all EGFR subgroups receiving TARCEVA plus gemcitabine: 5.0% in the EGFR positive subgroup, 9.7% in the EGFR negative subgroup and 9.2% in the EGFR unmeasured subgroup.

Figure 8: Survival in EGFR Positive Patients: 100 mg Cohort

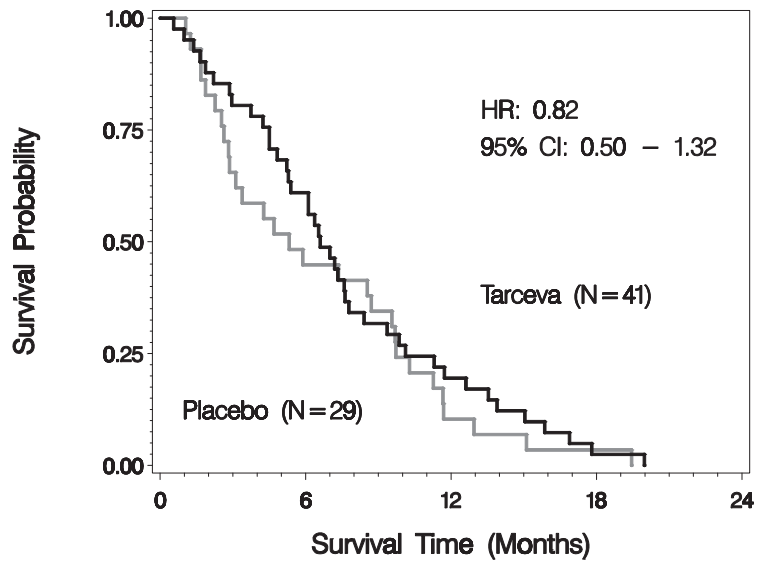


Figure 9: Survival in EGFR Negative Patients: 100 mg Cohort

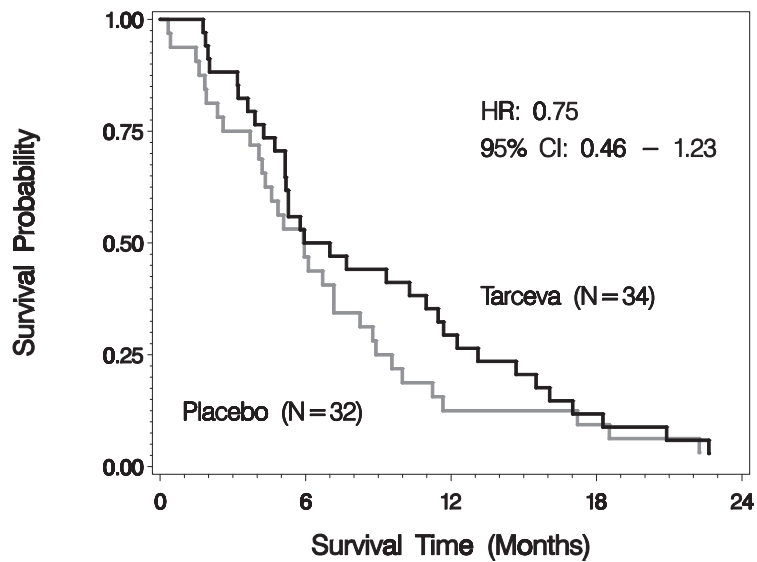
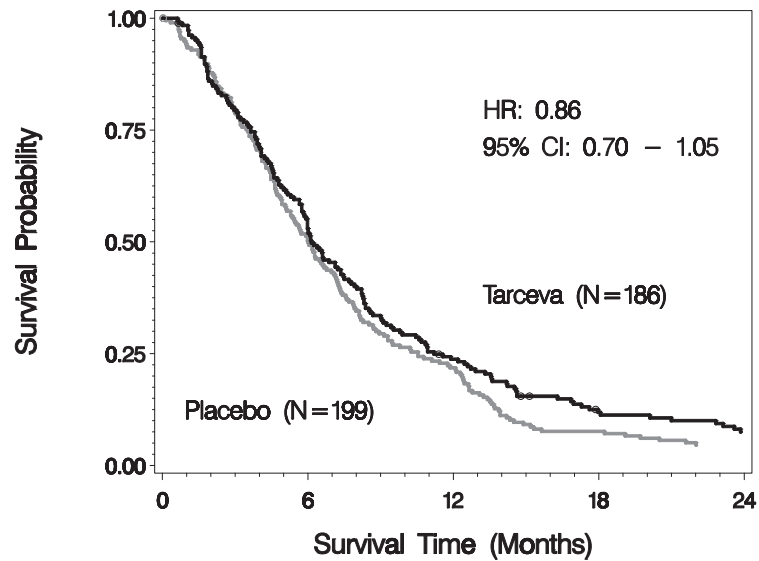


Figure 10: Survival in EGFR Unmeasured Patients: 100 mg Cohort



INDICATIONS AND USAGE

Non-Small Cell Lung Cancer

TARCEVA monotherapy is indicated for the treatment of patients with locally advanced or metastatic non-small cell lung cancer after failure of at least one prior chemotherapy regimen.

Results from two, multicenter, placebo-controlled, randomized, Phase 3 trials conducted in first-line patients with locally advanced or metastatic NSCLC showed no clinical benefit with the concurrent administration of TARCEVA with platinum-based chemotherapy [carboplatin and paclitaxel or gemcitabine and cisplatin] and its use is not recommended in that setting.

Pancreatic Cancer

TARCEVA in combination with gemcitabine is indicated for the first-line treatment of patients with locally advanced, unresectable or metastatic pancreatic cancer.

CONTRAINDICATIONS

None.

WARNINGS

Pulmonary Toxicity

There have been infrequent reports of serious Interstitial Lung Disease (ILD)-like events, including fatalities, in patients receiving TARCEVA for treatment of NSCLC, pancreatic cancer or other advanced solid tumors. In the randomized single-agent NSCLC study (see **CLINICAL STUDIES** section), the incidence of ILD-like events (0.8%) was the same in both the placebo and TARCEVA groups. In the pancreatic cancer study - in combination with gemcitabine - (see **CLINICAL STUDIES** section), the incidence of ILD-like events was 2.5% in the TARCEVA plus gemcitabine group vs. 0.4% in the placebo plus gemcitabine group.

The overall incidence of ILD-like events in approximately 4900 TARCEVA-treated patients from all studies (including uncontrolled studies and studies with concurrent chemotherapy) was approximately 0.7%. Reported diagnoses in patients suspected of having ILD-like events included pneumonitis, radiation pneumonitis, hypersensitivity pneumonitis, interstitial pneumonia, interstitial lung disease, obliterative bronchiolitis, pulmonary fibrosis, Acute Respiratory Distress Syndrome and lung infiltration. Symptoms started from 5 days to more than 9 months (median 39 days) after initiating TARCEVA therapy. In the lung cancer trials most of the cases were associated with confounding or contributing factors such as concomitant/prior chemotherapy, prior radiotherapy, pre-existing parenchymal lung disease, metastatic lung disease, or pulmonary infections.

In the event of an acute onset of new or progressive, unexplained pulmonary symptoms such as dyspnea, cough, and fever, TARCEVA therapy should be interrupted pending diagnostic evaluation. If ILD is diagnosed, TARCEVA should be discontinued and appropriate treatment instituted as needed (see **ADVERSE REACTIONS** and **DOSAGE AND ADMINISTRATION - Dose Modifications** sections).

Myocardial infarction/ischemia:

In the pancreatic carcinoma trial, six patients (incidence of 2.3%) in the TARCEVA/gemcitabine group developed myocardial infarction/ischemia. One of these patients died due to myocardial infarction. In comparison, 3 patients in the placebo/gemcitabine group developed myocardial infarction (incidence 1.2%) and one died due to myocardial infarction.

Cerebrovascular accident:

In the pancreatic carcinoma trial, six patients in the TARCEVA/gemcitabine group developed cerebrovascular accidents (incidence: 2.3%) One of these was hemorrhagic and was the only fatal event. In comparison, in the placebo/gemcitabine group there were no cerebrovascular accidents.

Microangiopathic Hemolytic Anemia with Thrombocytopenia:

In the pancreatic carcinoma trial, two patients in the TARCEVA/gemcitabine group developed microangiopathic hemolytic anemia with thrombocytopenia (incidence: 0.8%). Both patients received TARCEVA and gemcitabine concurrently. In comparison, in the placebo/gemcitabine group there were no cases of microangiopathic hemolytic anemia with thrombocytopenia.

Pregnancy Category D

Erlotinib has been shown to cause maternal toxicity with associated embryo/fetal lethality and abortion in rabbits when given at doses that result in plasma drug concentrations of approximately 3 times those in humans (AUCs at 150 mg daily dose). When given during the period of organogenesis to achieve plasma drug concentrations approximately equal to those in humans, based on AUC, there was no increased incidence of embryo/fetal lethality or abortion in rabbits or rats. However, female rats treated with 30 mg/m²/day or 60 mg/m²/day (0.3 or 0.7 times the clinical dose, on a mg/m² basis) of erlotinib prior to mating through the first week of pregnancy had an increase in early resorptions that resulted in a decrease in the number of live fetuses.

No teratogenic effects were observed in rabbits or rats.

There are no adequate and well-controlled studies in pregnant women using TARCEVA. Women of childbearing potential should be advised to avoid pregnancy while on TARCEVA. Adequate contraceptive methods should be used during therapy, and for at least 2 weeks after completing therapy. Treatment should only be continued in pregnant women if the potential benefit to the mother outweighs the risk to the fetus. If TARCEVA is used during pregnancy, the patient should be apprised of the potential hazard to the fetus or potential risk for loss of the pregnancy.

PRECAUTIONS

Drug Interactions

Co-treatment with the potent CYP3A4 inhibitor ketoconazole increases erlotinib AUC by 2/3. Caution should be used when administering or taking TARCEVA with ketoconazole and other strong CYP3A4 inhibitors such as, but not limited to, atazanavir, clarithromycin, indinavir, itraconazole, nefazodone, nelfinavir, ritonavir, saquinavir, telithromycin, troleandomycin (TAO), and voriconazole (see **DOSAGE AND ADMINISTRATION - Dose Modifications** section).

Pre-treatment with the CYP3A4 inducer rifampicin decreased erlotinib AUC by about 2/3. Alternate treatments lacking CYP3A4 inducing activity should be considered. If an alternative treatment is unavailable, a TARCEVA dose greater than 150 mg should be considered for NSCLC patients, and greater than 100 mg considered for pancreatic cancer patients. If the TARCEVA dose is adjusted upward, the dose will need to be reduced upon discontinuation of rifampicin or other inducers. Other CYP3A4 inducers include, but are not limited to, rifabutin, rifapentine, phenytoin, carbamazepine, phenobarbital and St. John's Wort (see **DOSAGE AND ADMINISTRATION - Dose Modifications** section).

Hepatotoxicity

Asymptomatic increases in liver transaminases have been observed in TARCEVA treated patients; therefore, periodic liver function testing (transaminases, bilirubin, and alkaline phosphatase) should be considered. Dose reduction or interruption of TARCEVA should be considered if changes in liver function are severe (see **ADVERSE REACTIONS** section).

Patients with Hepatic Impairment

In vitro and *in vivo* evidence suggest that erlotinib is cleared primarily by the liver. Therefore, erlotinib exposure may be increased in patients with hepatic dysfunction (see **CLINICAL PHARMACOLOGY - Special Populations - Patients with Hepatic Impairment** and **DOSAGE AND ADMINISTRATION - Dose Modification** sections).

Elevated International Normalized Ratio and Potential Bleeding

International Normalized Ratio (INR) elevations and infrequent reports of bleeding events including gastrointestinal and non-gastrointestinal bleedings have been reported in clinical studies, some associated with concomitant warfarin administration. Patients taking warfarin or other coumarin-derivative anticoagulants should be monitored regularly for changes in prothrombin time or INR (see **ADVERSE REACTIONS** section).

Carcinogenesis, Mutagenesis, Impairment of Fertility

Erlotinib has not been tested for carcinogenicity.

Erlotinib has been tested for genotoxicity in a series of *in vitro* assays (bacterial mutation, human lymphocyte chromosome aberration, and mammalian cell mutation) and an *in vivo* mouse bone marrow micronucleus test and did not cause genetic damage. Erlotinib did not impair fertility in either male or female rats.

Pregnancy

Pregnancy Category D (see **WARNINGS** and **PRECAUTIONS - Information for Patients** sections).

Nursing Mothers

It is not known whether erlotinib is excreted in human milk. Because many drugs are excreted in human milk and because the effects of TARCEVA on infants have not been studied, women should be advised against breast-feeding while receiving TARCEVA therapy.

Pediatric Use

The safety and effectiveness of TARCEVA in pediatric patients have not been studied.

Geriatric Use

Of the total number of patients participating in the randomized NSCLC trial, 62% were less than 65 years of age, and 38% of patients were aged 65 years or older. The survival benefit was maintained across both age groups (see **CLINICAL STUDIES** section). In the pancreatic cancer study, 53% of patients were younger than 65 years of age and 47% were 65 years of age or older. No meaningful differences in safety or pharmacokinetics were observed between younger and older patients in either study. Therefore, no dosage adjustments are recommended in elderly patients.

Information for Patients

If the following signs or symptoms occur, patients should seek medical advice promptly (see **WARNINGS, ADVERSE REACTIONS** and **DOSAGE AND ADMINISTRATION - Dose Modification** sections).

- Severe or persistent diarrhea, nausea, anorexia, or vomiting
- Onset or worsening of unexplained shortness of breath or cough
- Eye irritation

Women of childbearing potential should be advised to avoid becoming pregnant while taking TARCEVA (see **WARNINGS - Pregnancy Category D** section).

ADVERSE REACTIONS

Safety evaluation of TARCEVA is based on 856 cancer patients who received TARCEVA as monotherapy, 308 patients who received TARCEVA 100 or 150 mg plus gemcitabine, and 1228 patients who received TARCEVA concurrently with other chemotherapies.

There have been reports of serious events, including fatalities, in patients receiving TARCEVA for treatment of NSCLC, pancreatic cancer or other advanced solid tumors (see **WARNINGS**, and **DOSAGE AND ADMINISTRATION - Dose Modifications** sections).

Non-Small Cell Lung Cancer

Adverse events, regardless of causality, that occurred in at least 10% of patients treated with single-agent TARCEVA at 150 mg and at least 3% more often than in the placebo group in the randomized trial of patients with NSCLC are summarized by NCI-CTC (version 2.0) Grade in Table 5.

The most common adverse reactions in patients receiving single-agent TARCEVA 150 mg were rash and diarrhea. Grade 3/4 rash and diarrhea occurred in 9% and 6%, respectively, in TARCEVA-treated patients. Rash and diarrhea each resulted in study discontinuation in 1% of TARCEVA-treated patients. Six percent and 1% of patients needed dose reduction for rash and diarrhea, respectively. The median time to onset of rash was 8 days, and the median time to onset of diarrhea was 12 days.

Table 5: Adverse Events Occurring in $\geq 10\%$ of Single-Agent TARCEVA-treated Non-Small Cell Lung Cancer Patients (2:1 Randomization of TARCEVA to Placebo)

NCI CTC Grade	TARCEVA 150 mg N = 485			Placebo N = 242		
	Any Grade	Grade 3	Grade 4	Any Grade	Grade 3	Grade 4
MedDRA Preferred Term	%	%	%	%	%	%
Rash	75	8	<1	17	0	0
Diarrhea	54	6	<1	18	<1	0
Anorexia	52	8	1	38	5	<1
Fatigue	52	14	4	45	16	4
Dyspnea	41	17	11	35	15	11
Cough	33	4	0	29	2	0
Nausea	33	3	0	24	2	0
Infection	24	4	0	15	2	0
Vomiting	23	2	<1	19	2	0
Stomatitis	17	<1	0	3	0	0
Pruritus	13	<1	0	5	0	0
Dry skin	12	0	0	4	0	0
Conjunctivitis	12	<1	0	2	<1	0
Keratoconjunctivitis sicca	12	0	0	3	0	0
Abdominal pain	11	2	<1	7	1	<1

Liver function test abnormalities (including elevated alanine aminotransferase (ALT), aspartate aminotransferase (AST) and bilirubin) were observed in patients receiving single-agent TARCEVA 150 mg. These elevations were mainly transient or associated with liver metastases. Grade 2 (>2.5 – 5.0 x ULN) ALT elevations occurred in 4% and <1% of TARCEVA and placebo treated patients, respectively. Grade 3 (>5.0 – 20.0 x ULN) elevations were not observed in TARCEVA-treated patients. Dose reduction or interruption of TARCEVA should be considered if changes in liver function are severe (see **DOSAGE AND ADMINISTRATION - Dose Modification** section).

Pancreatic Cancer

Adverse events, regardless of causality, that occurred in at least 10% of patients treated with TARCEVA 100 mg plus gemcitabine in the randomized trial of patients with pancreatic cancer are summarized by NCI-CTC (version 2.0) Grade in Table 6.

The most common adverse reactions in pancreatic cancer patients receiving TARCEVA 100 mg plus gemcitabine were fatigue, rash, nausea, anorexia and diarrhea. In the TARCEVA plus gemcitabine arm, Grade 3/4 rash and diarrhea were each reported in 5% of TARCEVA plus gemcitabine-treated patients. The median time to onset of rash and diarrhea was 10 days and 15 days, respectively. Rash and diarrhea each resulted in dose reductions in 2% of patients, and resulted in study discontinuation in up to 1% of patients receiving TARCEVA plus gemcitabine. The 150 mg cohort was associated with a higher rate of certain class-specific adverse reactions including rash and required more frequent dose reduction or interruption.

Table 6: Adverse Events Occurring in ≥10% of TARCEVA-treated Pancreatic Cancer Patients: 100 mg cohort

NCI CTC Grade	TARCEVA + Gemcitabine 1000 mg/m ² IV N=259			Placebo + Gemcitabine 1000 mg/m ² IV N=256		
	Any Grade	Grade 3	Grade 4	Any Grade	Grade 3	Grade 4
MedDRA Preferred Term	%	%	%	%	%	%
Fatigue	73	14	2	70	13	2
Rash	69	5	0	30	1	0
Nausea	60	7	0	58	7	0
Anorexia	52	6	<1	52	5	<1

	TARCEVA + Gemcitabine 1000 mg/m ² IV N=259			Placebo + Gemcitabine 1000 mg/m ² IV N=256		
NCI CTC Grade	Any Grade	Grade 3	Grade 4	Any Grade	Grade 3	Grade 4
Diarrhea	48	5	<1	36	2	0
Abdominal pain	46	9	<1	45	12	<1
Vomiting	42	7	<1	41	4	<1
Weight decreased	39	2	0	29	<1	0
Infection*	39	13	3	30	9	2
Edema	37	3	<1	36	2	<1
Pyrexia	36	3	0	30	4	0
Constipation	31	3	1	34	5	1
Bone pain	25	4	<1	23	2	0
Dyspnea	24	5	<1	23	5	0
Stomatitis	22	<1	0	12	0	0
Myalgia	21	1	0	20	<1	0
Depression	19	2	0	14	<1	0
Dyspepsia	17	<1	0	13	<1	0
Cough	16	0	0	11	0	0
Dizziness	15	<1	0	13	0	<1
Headache	15	<1	0	10	0	0
Insomnia	15	<1	0	16	<1	0
Alopecia	14	0	0	11	0	0
Anxiety	13	1	0	11	<1	0
Neuropathy	13	1	<1	10	<1	0
Flatulence	13	0	0	9	<1	0
Rigors	12	0	0	9	0	0

*Includes all MedDRA preferred terms in the Infections and Infestations System Organ Class

In the pancreatic carcinoma trial, 10 patients in the TARCEVA/gemcitabine group developed deep venous thrombosis (incidence: 3.9%). In comparison, 3 patients in the placebo/gemcitabine group developed deep venous thrombosis (incidence 1.2%). The overall incidence of grade 3 or 4 thrombotic events, including deep venous thrombosis, was similar in the two treatment arms: 11% for TARCEVA plus gemcitabine and 9% for placebo plus gemcitabine.

No differences in Grade 3 or Grade 4 hematologic laboratory toxicities were detected between the TARCEVA plus gemcitabine group compared to the placebo plus gemcitabine group.

Severe adverse events (\geq grade 3 NCI CTC) in the TARCEVA plus gemcitabine group with incidences $< 5\%$ included syncope, arrhythmias, ileus, pancreatitis, hemolytic anemia including microangiopathic hemolytic anemia with thrombocytopenia, myocardial infarction/ischemia, cerebrovascular accidents including cerebral hemorrhage, and renal insufficiency (see **WARNINGS** section).

Liver function test abnormalities (including elevated alanine aminotransferase (ALT), aspartate aminotransferase (AST) and bilirubin) have been observed following the administration of TARCEVA plus gemcitabine in patients with pancreatic cancer. Table 7 displays the most severe NCI-CTC grade of liver function abnormalities that developed. Dose reduction or interruption of TARCEVA should be considered if changes in liver function are severe (see **DOSAGE AND ADMINISTRATION - Dose Modification** section).

Table 7: Liver Function Test Abnormalities (most severe NCI-CTC grade) in Pancreatic Cancer Patients: 100 mg Cohort

	TARCEVA + Gemcitabine 1000 mg/m ² IV N = 259			Placebo + Gemcitabine 1000 mg/m ² IV N = 256		
NCI CTC Grade	Grade 2	Grade 3	Grade 4	Grade 2	Grade 3	Grade 4
Bilirubin	17 %	10%	<1%	11%	10%	3%
ALT	31%	13%	<1%	22%	9%	0%
AST	24%	10%	<1%	19%	9%	0%

NSCLC and Pancreatic Cancer Indications

During the NSCLC and the combination pancreatic cancer trials, infrequent cases of gastrointestinal bleeding have been reported, some associated with concomitant warfarin or NSAID administration (see **PRECAUTIONS - Elevated International Normalized Ratio and Potential Bleeding** section). These adverse events were reported as peptic ulcer bleeding (gastritis, gastroduodenal ulcers), hematemesis, hematochezia, melena and hemorrhage from possible colitis (see **PRECAUTIONS** section). Cases of Grade 1 epistaxis were also reported in both the single-agent NSCLC and the pancreatic cancer clinical trials.

NCI-CTC Grade 3 conjunctivitis and keratitis have been reported infrequently in patients receiving TARCEVA therapy in the NSCLC and pancreatic cancer clinical trials. Corneal ulcerations may also occur (see **PRECAUTIONS - Information for Patients** section).

In general, no notable differences in the safety of TARCEVA monotherapy or in combination with gemcitabine could be discerned between females or males and between patients younger or older than the age of 65 years. The safety of TARCEVA appears similar in Caucasian and Asian patients (see **PRECAUTIONS - Geriatric Use** section).

OVERDOSAGE

Single oral doses of TARCEVA up to 1,000 mg in healthy subjects and up to 1,600 mg in cancer patients have been tolerated. Repeated twice-daily doses of 200 mg single-agent TARCEVA in healthy subjects were poorly tolerated after only a few days of dosing. Based on the data from these studies, an unacceptable incidence of severe adverse events, such as diarrhea, rash, and liver transaminase elevation, may occur above the recommended dose (see **DOSAGE AND ADMINISTRATION** section). In case of suspected overdose, TARCEVA should be withheld and symptomatic treatment instituted.

DOSAGE AND ADMINISTRATION

Non-Small Cell Lung Cancer

The recommended daily dose of TARCEVA is 150 mg taken at least one hour before or two hours after the ingestion of food. Treatment should continue until disease progression or unacceptable toxicity occurs. There is no evidence that treatment beyond progression is beneficial.

Pancreatic Cancer

The recommended daily dose of TARCEVA is 100 mg taken at least one hour before or two hours after the ingestion of food, in combination with gemcitabine (see the gemcitabine package insert). Treatment should continue until disease progression or unacceptable toxicity occurs.

Dose Modifications

In patients who develop an acute onset of new or progressive pulmonary symptoms, such as dyspnea, cough or fever, treatment with TARCEVA should be interrupted pending diagnostic evaluation. If ILD is diagnosed, TARCEVA should be discontinued and appropriate treatment instituted as necessary (see **WARNINGS – Pulmonary Toxicity** section).

Diarrhea can usually be managed with loperamide. Patients with severe diarrhea who are unresponsive to loperamide or who become dehydrated may require dose reduction or temporary interruption of therapy. Patients with severe skin reactions may also require dose reduction or temporary interruption of therapy.

When dose reduction is necessary, the TARCEVA dose should be reduced in 50 mg decrements.

In patients who are being concomitantly treated with a strong CYP3A4 inhibitor such as, but not limited to, atazanavir, clarithromycin, indinavir, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, saquinavir, telithromycin, troleandomycin (TAO), or voriconazole, a dose reduction should be considered should severe adverse reactions occur.

Pre-treatment with the CYP3A4 inducer rifampicin decreased erlotinib AUC by about 2/3. Alternate treatments lacking CYP3A4 inducing activity should be considered. If an alternative treatment is unavailable, a TARCEVA dose greater than 150 mg should be considered. If the TARCEVA dose is adjusted upward, the dose will need to be reduced upon discontinuation of rifampicin or other inducers. Other CYP3A4 inducers include, but are not limited to rifabutin, rifapentine, phenytoin, carbamazepine, phenobarbital and St. John's Wort. These too should be avoided if possible (see **PRECAUTIONS - Drug Interactions** section).

Erlotinib is eliminated by hepatic metabolism and biliary excretion. Therefore, caution should be used when administering TARCEVA to patients with hepatic impairment. Dose reduction or interruption of TARCEVA should be considered should severe adverse reactions occur (see **CLINICAL PHARMACOLOGY - Special Populations - Patients With Hepatic Impairment, PRECAUTIONS - Patients With Hepatic Impairment, and ADVERSE REACTIONS** sections).

HOW SUPPLIED

The 25 mg, 100 mg and 150 mg strengths are supplied as white film-coated tablets for daily oral administration.

TARCEVA[®] (erlotinib) Tablets, 25 mg: Round, biconvex face and straight sides, white film-coated, printed in orange with a “T” and “25” on one side and plain on the other side. Supplied in bottles of 30 tablets (NDC 50242-062-01).

TARCEVA[®] (erlotinib) Tablets, 100 mg: Round, biconvex face and straight sides, white film-coated, printed in gray with “T” and “100” on one side and plain on the other side. Supplied in bottles of 30 tablets (NDC 50242-063-01).

TARCEVA[®] (erlotinib) Tablets, 150 mg: Round, biconvex face and straight sides, white film-coated, printed in maroon with “T” and “150” on one side and plain on the other side. Supplied in bottles of 30 tablets (NDC 50242-064-01).

STORAGE

Store at 25°C (77°F); excursions permitted to 15° – 30°C (59° – 86°F). See USP Controlled Room Temperature.

Manufactured for:

OSI Pharmaceuticals Inc., Melville, NY 11747

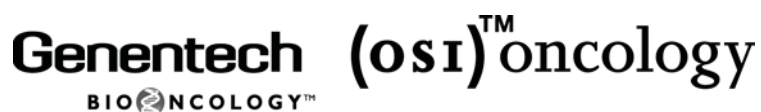
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Schwarz Pharma Manufacturing, Seymour, IN 47274

Distributed by:

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For further information please call 1-877-TARCEVA (1-877-827-2382).



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Rev. 10/18/05