

**ANNEX I**  
**SUMMARY OF PRODUCT CHARACTERISTICS**

## 1. NAME OF THE MEDICINAL PRODUCT

Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion  
Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion  
Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

### Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion

Each vial contains 100 mg of pemetrexed (as pemetrexed ditromethamine).

### Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion

Each vial contains 500 mg of pemetrexed (as pemetrexed ditromethamine).

### Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion

Each vial contains 1,000 mg of pemetrexed (as pemetrexed ditromethamine).

After reconstitution (see section 6.6), each vial contains 25 mg/ml of pemetrexed.

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Powder for concentrate for solution for infusion.

A white to light yellow or green-yellow lyophilised powder.

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

#### Malignant pleural mesothelioma

Pemetrexed Hospira UK Limited in combination with cisplatin is indicated for the treatment of chemotherapy naïve patients with unresectable malignant pleural mesothelioma.

#### Non-small cell lung cancer

Pemetrexed Hospira UK Limited in combination with cisplatin is indicated for the first-line treatment of patients with locally advanced or metastatic non-small cell lung cancer other than predominantly squamous cell histology (see section 5.1).

Pemetrexed Hospira UK Limited is indicated as monotherapy for the maintenance treatment of locally advanced or metastatic non-small cell lung cancer other than predominantly squamous cell histology in patients whose disease has not progressed immediately following platinum-based chemotherapy (see section 5.1).

Pemetrexed Hospira UK Limited is indicated as monotherapy for the second-line treatment of patients with locally advanced or metastatic non-small cell lung cancer other than predominantly squamous cell histology (see section 5.1).

## 4.2 Posology and method of administration

Pemetrexed must only be administered under the supervision of a physician qualified in the use of anti-cancer chemotherapy.

### Posology

#### *Pemetrexed in combination with cisplatin*

The recommended dose of pemetrexed is 500 mg/m<sup>2</sup> of body surface area (BSA) administered as an intravenous infusion over 10 minutes on the first day of each 21-day cycle. The recommended dose of cisplatin is 75 mg/m<sup>2</sup> BSA infused over two hours approximately 30 minutes after completion of the pemetrexed infusion on the first day of each 21-day cycle. Patients must receive adequate anti-emetic treatment and appropriate hydration prior to and/or after receiving cisplatin (see also cisplatin Summary of Product Characteristics for specific dosing advice).

#### *Pemetrexed as a single agent*

In patients treated for non-small cell lung cancer after prior chemotherapy, the recommended dose of pemetrexed is 500 mg/m<sup>2</sup> BSA administered as an intravenous infusion over 10 minutes on the first day of each 21-day cycle.

#### *Pre-medication regimen*

To reduce the incidence and severity of skin reactions, a corticosteroid should be given the day prior to, on the day of, and the day after pemetrexed administration. The corticosteroid should be equivalent to 4 mg of dexamethasone administered orally twice a day (see section 4.4).

To reduce toxicity, patients treated with pemetrexed must also receive vitamin supplementation (see section 4.4). Patients must take oral folic acid or a multivitamin containing folic acid (350 to 1,000 micrograms) on a daily basis. At least five doses of folic acid must be taken during the seven days preceding the first dose of pemetrexed, and dosing must continue during the full course of therapy and for 21 days after the last dose of pemetrexed. Patients must also receive an intramuscular injection of vitamin B<sub>12</sub> (1,000 micrograms) in the week preceding the first dose of pemetrexed and once every three cycles thereafter. Subsequent vitamin B<sub>12</sub> injections may be given on the same day as pemetrexed.

#### *Monitoring*

Patients receiving pemetrexed should be monitored before each dose with a complete blood count, including a differential white cell count (WCC) and platelet count. Prior to each chemotherapy administration, blood chemistry tests should be collected to evaluate renal and hepatic function. Before the start of any cycle of chemotherapy, patients are required to have the following: absolute neutrophil count (ANC) should be  $\geq 1,500$  cells/mm<sup>3</sup> and platelets should be  $\geq 100,000$  cells/mm<sup>3</sup>.

Creatinine clearance should be  $\geq 45$  ml/min.

The total bilirubin should be  $\leq 1.5$ -times upper limit of normal. Alkaline phosphatase (ALP), aspartate aminotransferase (AST or SGOT), and alanine aminotransferase (ALT or SGPT) should be  $\leq 3$ -times upper limit of normal. Alkaline phosphatase, AST, and ALT  $\leq 5$ -times upper limit of normal is acceptable if liver has tumour involvement.

#### *Dose adjustments*

Dose adjustments at the start of a subsequent cycle should be based on nadir haematologic counts or maximum non-haematologic toxicity from the preceding cycle of therapy. Treatment may be delayed to allow sufficient time for recovery. Upon recovery, patients should be re-treated using the guidelines

in Tables 1, 2, and 3, which are applicable for pemetrexed used as a single agent or in combination with cisplatin.

<b>Table 1. Dose modification table for pemetrexed (as a single agent or in combination) and cisplatin - Haematologic toxicities</b>	
Nadir ANC < 500/mm <sup>3</sup> and nadir platelets ≥ 50,000/mm <sup>3</sup>	75% of previous dose (both pemetrexed and cisplatin)
Nadir platelets < 50,000/mm <sup>3</sup> regardless of nadir ANC	75% of previous dose (both pemetrexed and cisplatin)
Nadir platelets < 50,000/mm <sup>3</sup> with bleeding <sup>a</sup> , regardless of nadir ANC	50% of previous dose (both pemetrexed and cisplatin)
<sup>a</sup> These criteria meet the National Cancer Institute Common Toxicity Criteria (CTC v2.0; NCI 1998) definition of ≥ CTC Grade 2 bleeding.	

If patients develop non-haematologic toxicities ≥ Grade 3 (excluding neurotoxicity), pemetrexed should be withheld until resolution to less than or equal to the patient's pre-therapy value. Treatment should be resumed according to the guidelines in Table 2.

<b>Table 2. Dose modification table for pemetrexed (as a single agent or in combination) and cisplatin - Non-haematologic toxicities<sup>a, b</sup></b>		
	<b>Dose of pemetrexed (mg/m<sup>2</sup>)</b>	<b>Dose for cisplatin (mg/m<sup>2</sup>)</b>
Any Grade 3 or 4 toxicities except mucositis	75% of previous dose	75% of previous dose
Any diarrhoea requiring hospitalisation (irrespective of grade) or Grade 3 or 4 diarrhoea	75% of previous dose	75% of previous dose
Grade 3 or 4 mucositis	50% of previous dose	100% of previous dose
<sup>a</sup> National Cancer Institute Common Toxicity Criteria (CTC v2.0; NCI 1998)		
<sup>b</sup> Excluding neurotoxicity		

In the event of neurotoxicity, the recommended dose adjustment for pemetrexed and cisplatin is documented in Table 3. Patients should discontinue therapy if Grade 3 or 4 neurotoxicity is observed.

<b>Table 3. Dose modification table for pemetrexed (as a single agent or in combination) and cisplatin - neurotoxicity</b>		
<b>CTC<sup>a</sup> Grade</b>	<b>Dose of pemetrexed (mg/m<sup>2</sup>)</b>	<b>Dose for cisplatin (mg/m<sup>2</sup>)</b>
0-1	100% of previous dose	100% of previous dose
2	100% of previous dose	50% of previous dose
<sup>a</sup> National Cancer Institute Common Toxicity Criteria (CTC v2.0; NCI 1998)		

Treatment with pemetrexed should be discontinued if a patient experiences any haematologic or non-haematologic Grade 3 or 4 toxicity after 2 dose reductions or immediately if Grade 3 or 4 neurotoxicity is observed.

#### Elderly

In clinical studies, there has been no indication that patients 65 years of age or older are at increased risk of adverse events compared to patients younger than 65 years old. No dose reductions other than those recommended for all patients are necessary.

#### Paediatric population

There is no relevant use of pemetrexed in the paediatric population in malignant pleural mesothelioma and non-small cell lung cancer.

Patients with renal impairment (Standard Cockcroft and Gault formula or glomerular filtration rate measured Tc99m DPTA serum clearance method)

Pemetrexed is primarily eliminated unchanged by renal excretion. In clinical studies, patients with creatinine clearance of  $\geq 45$  ml/min required no dose adjustments other than those recommended for all patients. There are insufficient data on the use of pemetrexed in patients with creatinine clearance below 45 ml/min; therefore, the use of pemetrexed is not recommended (see section 4.4).

Patients with hepatic impairment

No relationships between AST (SGOT), ALT (SGPT), or total bilirubin and pemetrexed pharmacokinetics were identified. However, patients with hepatic impairment, such as bilirubin  $> 1.5$ -times the upper limit of normal and/or aminotransferase  $> 3.0$ -times the upper limit of normal (hepatic metastases absent) or  $> 5.0$  times the upper limit of normal (hepatic metastases present), have not been specifically studied.

Method of administration

For Precautions to be taken before handling or administering Pemetrexed Hospira Limited, see section 6.6.

Pemetrexed Hospira UK Limited is for intravenous use. It must be administered as an intravenous infusion over 10 minutes on the first day of each 21-day cycle. For instructions on reconstitution and dilution of Pemetrexed Hospira UK Limited before administration, see section 6.6

### **4.3 Contraindications**

Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.

Breast-feeding (see section 4.6).

Concomitant yellow fever vaccine (see section 4.5).

### **4.4 Special warnings and precautions for use**

Pemetrexed can suppress bone marrow function as manifested by neutropenia, thrombocytopenia, and anaemia (or pancytopenia) (see section 4.8). Myelosuppression is usually the dose-limiting toxicity. Patients should be monitored for myelosuppression during therapy and pemetrexed should not be given to patients until absolute neutrophil count (ANC) returns to  $\geq 1,500$  cells/mm<sup>3</sup> and platelet count returns to  $\geq 100,000$  cells/mm<sup>3</sup>. Dose reductions for subsequent cycles are based on nadir ANC, platelet count, and maximum non-haematologic toxicity seen from the previous cycle (see section 4.2).

Less toxicity and reduction in Grade 3/4 haematologic and non-haematologic toxicities, such as neutropenia, febrile neutropenia, and infection with Grade 3/4 neutropenia, were reported when pre-treatment with folic acid and vitamin B<sub>12</sub> was administered. Therefore, all patients treated with pemetrexed must be instructed to take folic acid and vitamin B<sub>12</sub> as a prophylactic measure to reduce treatment-related toxicity (see section 4.2).

Skin reactions have been reported in patients not pre-treated with a corticosteroid. Pre-treatment with dexamethasone (or equivalent) can reduce the incidence and severity of skin reactions (see section 4.2).

An insufficient number of patients have been studied with creatinine clearance of below 45 ml/min. Therefore, the use of pemetrexed in patients with creatinine clearance of  $<45$  ml/min is not recommended (see section 4.2).

Patients with mild to moderate renal insufficiency (creatinine clearance from 45 to 79 ml/min) should avoid taking non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, and acetylsalicylic acid ( $>1.3$  g daily) for 2 days before, on the day of, and 2 days following pemetrexed administration (see section 4.5).

In patients with mild to moderate renal insufficiency eligible for pemetrexed therapy, NSAIDs with long elimination half-lives should be interrupted for at least 5 days prior to, on the day of, and at least 2 days following pemetrexed administration (see section 4.5).

Serious renal events, including acute renal failure, have been reported with pemetrexed alone or in association with other chemotherapeutic agents. Many of the patients in whom these occurred had underlying risk factors for the development of renal events, including dehydration or pre-existing hypertension or diabetes. Nephrogenic diabetes insipidus and renal tubular necrosis were also reported in post marketing setting with pemetrexed alone or with other chemotherapeutic agents. Most of these events resolved after pemetrexed withdrawal. Patients should be regularly monitored for acute tubular necrosis, decreased renal function and signs and symptoms of nephrogenic diabetes insipidus (e.g. hypernatraemia).

The effect of third-space fluid, such as pleural effusion or ascites, on pemetrexed is not fully defined. A Phase 2 study of pemetrexed in 31 solid tumour patients with stable third-space fluid demonstrated no difference in pemetrexed dose normalised plasma concentrations or clearance compared to patients without third-space fluid collections. Thus, drainage of third-space fluid collection prior to pemetrexed treatment should be considered, but may not be necessary.

Due to the gastrointestinal toxicity of pemetrexed given in combination with cisplatin, severe dehydration has been observed. Therefore, patients should receive adequate anti-emetic treatment and appropriate hydration prior to and/or after receiving treatment.

Serious cardiovascular events, including myocardial infarction and cerebrovascular events have been uncommonly reported during clinical studies with pemetrexed, usually when given in combination with another cytotoxic agent. Most of the patients in whom these events have been observed had pre-existing cardiovascular risk factors (see section 4.8).

Immunodepressed status is common in cancer patients. As a result, concomitant use of live attenuated vaccines is not recommended (see sections 4.3 and 4.5).

Pemetrexed can have genetically damaging effects. Sexually mature males are advised not to father a child during the treatment and up to 6 months thereafter. Contraceptive measures or abstinence are recommended. Owing to the possibility of pemetrexed treatment causing irreversible infertility, men are advised to seek counselling on sperm storage before starting treatment.

Women of childbearing potential must use effective contraception during treatment with pemetrexed (see section 4.6).

Cases of radiation pneumonitis have been reported in patients treated with radiation either prior, during, or subsequent to their pemetrexed therapy. Particular attention should be paid to these patients, and caution exercised with use of other radiosensitising agents.

Cases of radiation recall have been reported in patients who received radiotherapy weeks or years previously.

#### **4.5 Interaction with other medicinal products and other forms of interaction**

Pemetrexed is mainly eliminated unchanged renally by tubular secretion and to a lesser extent by glomerular filtration. Concomitant administration of nephrotoxic medicinal products (e.g., aminoglycoside, loop diuretics, platinum compounds, ciclosporin) could potentially result in delayed clearance of pemetrexed. This combination should be used with caution. If necessary, creatinine clearance should be closely monitored.

Concomitant administration of substances that are also tubularly secreted (e.g., probenecid, penicillin) could potentially result in delayed clearance of pemetrexed. Caution should be made when these

medicinal products are combined with pemetrexed. If necessary, creatinine clearance should be closely monitored.

In patients with normal renal function (creatinine clearance  $\geq 80$  ml/min), high doses of non-steroidal anti-inflammatory drugs (NSAIDs, such as ibuprofen  $> 1600$  mg/day) and acetylsalicylic acid at higher doses ( $\geq 1.3$  g daily) may decrease pemetrexed elimination and, consequently, increase the occurrence of pemetrexed adverse events. Therefore, caution should be made when administering higher doses of NSAIDs or acetylsalicylic acid, concurrently with pemetrexed to patients with normal function (creatinine clearance  $\geq 80$  ml/min).

In patients with mild to moderate renal insufficiency (creatinine clearance from 45 to 79 ml/min), the concomitant administration of pemetrexed with NSAIDs (e.g., ibuprofen) or acetylsalicylic acid at higher doses should be avoided for 2 days before, on the day of, and 2 days following pemetrexed administration (see section 4.4).

In the absence of data regarding potential interaction with NSAIDs having longer half-lives such as piroxicam or rofecoxib, the concomitant administration with pemetrexed in patients with mild to moderate renal insufficiency should be interrupted for at least 5 days prior to, on the day of, and at least 2 days following pemetrexed administration (see section 4.4). If concomitant administration of NSAIDs is necessary, patients should be monitored closely for toxicity, especially myelosuppression and gastrointestinal toxicity.

Pemetrexed undergoes limited hepatic metabolism. Results from *in vitro* studies with human liver microsomes indicated that pemetrexed would not be predicted to cause clinically significant inhibition of the metabolic clearance of medicinal products metabolised by CYP3A, CYP2D6, CYP2C9, and CYP1A2.

#### Interactions common to all cytotoxics

Due to the increased thrombotic risk in patients with cancer, the use of anticoagulation treatment is frequent. The high intra-individual variability of the coagulation status during diseases and the possibility of interaction between oral anticoagulants and anti-cancer chemotherapy require increased frequency of INR (International Normalised Ratio) monitoring, if it is decided to treat the patient with oral anticoagulants.

#### Concomitant use contraindicated

*Yellow fever vaccine*: Risk of fatal generalised vaccinale disease (see section 4.3).

#### Concomitant use not recommended

*Live attenuated vaccines (except yellow fever, for which concomitant use is contraindicated)*: Risk of systemic, possibly fatal, disease. The risk is increased in subjects who are already immunosuppressed by their underlying disease. Use an inactivated vaccine where it exists (poliomyelitis) (see section 4.4).

## **4.6 Fertility, pregnancy and lactation**

#### Contraception in males and females

Women of childbearing potential must use effective contraception during treatment with pemetrexed. Pemetrexed can have genetically damaging effects. Sexually mature males are advised not to father a child during the treatment, and up to 6 months thereafter. Contraceptive measures or abstinence are recommended.

#### Pregnancy

There are no data from the use of pemetrexed in pregnant women; but pemetrexed, like other anti-metabolites, is suspected to cause serious birth defects when administered during pregnancy. Animal studies have shown reproductive toxicity (see section 5.3). Pemetrexed should not be used during pregnancy unless clearly necessary, after a careful consideration of the needs of the mother and the risk for the foetus (see section 4.4).

### Breast-feeding

It is not known whether pemetrexed is excreted in human milk, and adverse reactions on the breast-feeding child cannot be excluded. Breast-feeding must be discontinued during pemetrexed therapy (see section 4.3).

### Fertility

Owing to the possibility of pemetrexed treatment causing irreversible infertility (see section 5.3), men are advised to seek counselling on sperm storage before starting treatment.

## **4.7 Effects on ability to drive and use machines**

No studies on the effects on the ability to drive and use machines have been performed. However, it has been reported that pemetrexed may cause fatigue. Therefore, patients should be cautioned against driving or operating machines if this event occurs.

## **4.8 Undesirable effects**

### Summary of the safety profile

The most commonly reported undesirable effects related to pemetrexed, whether used as monotherapy or in combination, are bone marrow suppression manifested as anaemia, neutropenia, leucopenia, thrombocytopenia; and gastrointestinal toxicities, manifested as anorexia, nausea, vomiting, diarrhoea, constipation, pharyngitis, mucositis, and stomatitis. Other undesirable effects include renal toxicities, increased aminotransferases, alopecia, fatigue, dehydration, rash, infection/sepsis and neuropathy. Rarely seen events include Stevens-Johnson syndrome and toxic epidermal necrolysis.

### Tabulated list of adverse reactions

The table below provides the frequency and severity of undesirable effects that have been reported in >5% of 168 patients with mesothelioma who were randomised to receive cisplatin and pemetrexed, and 163 patients with mesothelioma randomised to receive single-agent cisplatin. In both treatment arms, these chemo-naïve patients were fully supplemented with folic acid and vitamin B<sub>12</sub>.

Frequency estimate: Very common ( $\geq 1/10$ ), common ( $\geq 1/100$  to  $< 1/10$ ), uncommon ( $\geq 1/1,000$  to  $< 1/100$ ), rare ( $\geq 1/10,000$  to  $< 1/1,000$ ), very rare ( $< 1/10,000$ ) and not known (cannot be estimated from available data).

Within each frequency grouping, undesirable effects are presented in order of decreasing seriousness.

System organ class	Frequency	Event*	pemetrexed/cisplatin (N = 168)		cisplatin (N = 163)	
			All grades toxicity (%)	Grade 3-4 toxicity (%)	All grades toxicity (%)	Grade 3-4 toxicity (%)
Blood and lymphatic system disorders	Very common	Neutrophils/Granulocytes decreased	56.0	23.2	13.5	3.1
		Leucocytes decreased	53.0	14.9	16.6	0.6
		Haemoglobin decreased	26.2	4.2	10.4	0.0
		Platelets decreased	23.2	5.4	8.6	0.0
Metabolism and nutrition disorders	Common	Dehydration	6.5	4.2	0.6	0.6
Nervous system disorders	Very common	Neuropathy-sensory	10.1	0.0	9.8	0.6
	Common	Taste disturbance	7.7	0.0***	6.1	0.0***
Eye disorders	Common	Conjunctivitis	5.4	0.0	0.6	0.0



System organ class	Frequency	Event*	pemetrexed/cisplatin (N = 168)		cisplatin (N = 163)	
			All grades toxicity (%)	Grade 3-4 toxicity (%)	All grades toxicity (%)	Grade 3-4 toxicity (%)
Gastro-intestinal disorders	Very common	Diarrhoea	16.7	3.6	8.0	0.0
		Vomiting	56.5	10.7	49.7	4.3
		Stomatitis/Pharyngitis	23.2	3.0	6.1	0.0
		Nausea	82.1	11.9	76.7	5.5
		Anorexia	20.2	1.2	14.1	0.6
		Constipation	11.9	0.6	7.4	0.6
	Common	Dyspepsia	5.4	0.6	0.6	0.0
Skin and subcutaneous tissue disorders	Very common	Rash	16.1	0.6	4.9	0.0
		Alopecia	11.3	0.0***	5.5	0.0***
Renal and urinary disorders	Very common	Creatinine elevation	10.7	0.6	9.8	1.2
		Creatinine clearance decreased**	16.1	0.6	17.8	1.8
General disorders and administration site conditions	Very common	Fatigue	47.6	10.1	42.3	9.2

\* Refer to National Cancer Institute CTC version 2 for each grade of toxicity except the term “creatinine clearance decreased”.

\*\* Which is derived from the term “renal/genitourinary other”.

\*\*\* According to National Cancer Institute CTC (v2.0; NCI 1998), taste disturbance and alopecia should only be reported as Grade 1 or 2.

For the purpose of this table a cut off of 5% was used for inclusion of all events where the reporter considered a possible relationship to pemetrexed and cisplatin.

Clinically relevant CTC toxicities that were reported in  $\geq 1\%$  and  $\leq 5\%$  of the patients that were randomly assigned to receive cisplatin and pemetrexed include: renal failure, infection, pyrexia, febrile neutropenia, increased AST, ALT, and GGT, urticaria and chest pain.

Clinically relevant CTC toxicities that were reported in  $< 1\%$  of the patients that were randomly assigned to receive cisplatin and pemetrexed include arrhythmia and motor neuropathy.

The table below provides the frequency and severity of undesirable effects that have been reported in  $> 5\%$  of 265 patients randomly assigned to receive single-agent pemetrexed with folic acid and vitamin B<sub>12</sub> supplementation, and 276 patients randomly assigned to receive single-agent docetaxel. All patients were diagnosed with locally advanced or metastatic non-small cell lung cancer and received prior chemotherapy.

System organ class	Frequency	Event*	pemetrexed (N = 265)		docetaxel (N = 276)	
			All grades toxicity (%)	Grade 3-4 toxicity (%)	All grades toxicity (%)	Grade 3-4 toxicity (%)
Blood and lymphatic system disorders	Very common	Neutrophils/Granulocytes decreased	10.9	5.3	45.3	40.2
		Leucocytes decreased	12.1	4.2	34.1	27.2
		Haemoglobin decreased	19.2	4.2	22.1	4.3
	Common	Platelets decreased	8.3	1.9	1.1	0.4

System organ class	Frequency	Event*	pemetrexed (N = 265)		docetaxel (N = 276)	
			All grades toxicity (%)	Grade 3-4 toxicity (%)	All grades toxicity (%)	Grade 3-4 toxicity (%)
Gastrointestinal disorders	Very common	Diarrhoea	12.8	0.4	24.3	2.5
		Vomiting	16.2	1.5	12.0	1.1
		Stomatitis/ Pharyngitis	14.7	1.1	17.4	1.1
		Nausea	30.9	2.6	16.7	1.8
		Anorexia	21.9	1.9	23.9	2.5
	Common	Constipation	5.7	0.0	4.0	0.0
Hepatobiliary disorders	Common	SGPT (ALT) elevation	7.9	1.9	1.4	0.0
		SGOT (AST) elevation	6.8	1.1	0.7	0.0
Skin and subcutaneous tissue disorders	Very common	Rash/ desquamation	14.0	0.0	6.2	0.0
	Common	Pruritus	6.8	0.4	1.8	0.0
		Alopecia	6.4	0.4**	37.7	2.2**
General disorders and administration site conditions	Very common	Fatigue	34.0	5.3	35.9	5.4
	Common	Fever	8.3	0.0	7.6	0.0

\*Refer to National Cancer Institute CTC version 2 for each grade of toxicity.  
\*\*According to National Cancer Institute CTC (v2.0; NCI 1998), alopecia should only be reported as Grade 1 or 2.

For the purpose of this table a cut off of 5% was used for inclusion of all events where the reporter considered a possible relationship to pemetrexed.

Clinically relevant CTC toxicities that were reported in  $\geq 1\%$  and  $\leq 5\%$  of the patients that were randomly assigned to pemetrexed include: infection without neutropenia, febrile neutropenia, allergic reaction/hypersensitivity, increased creatinine, motor neuropathy, sensory neuropathy, erythema multiforme, and abdominal pain.

Clinically relevant CTC toxicities that were reported in  $< 1\%$  of the patients that were randomly assigned to pemetrexed include supraventricular arrhythmias.

Clinically relevant Grade 3 and Grade 4 laboratory toxicities were similar between integrated Phase 2 results from three single-agent pemetrexed studies (N = 164) and the Phase 3 single-agent pemetrexed study described above, with the exception of neutropenia (12.8% versus 5.3%, respectively) and alanine aminotransferase elevation (15.2% versus 1.9%, respectively). These differences were likely due to differences in the patient population, since the Phase 2 studies included both chemo-naïve and heavily pre-treated breast cancer patients with pre-existing liver metastases and/or abnormal baseline liver function tests.

The table below provides the frequency and severity of undesirable effects considered possibly related to study medicinal product that have been reported in  $> 5\%$  of 839 patients with NSCLC who were randomised to receive cisplatin and pemetrexed and 830 patients with NSCLC who were randomised to receive cisplatin and gemcitabine. All patients received study therapy as initial treatment for locally advanced or metastatic NSCLC and patients in both treatment groups were fully supplemented with folic acid and vitamin B<sub>12</sub>.

System organ class	Frequency	Event**	pemetrexed/cisplatin (N = 839)		gemcitabine/cisplatin (N = 830)	
			All grades toxicity(%)	Grade 3-4 toxicity (%)	All grades toxicity(%)	Grade 3-4 toxicity (%)
Blood and lymphatic system disorders	Very common	Haemoglobin decreased	33.0*	5.6*	45.7*	9.9*
		Neutrophils/Granulocytes decreased	29.0*	15.1*	38.4*	26.7*
		Leucocytes decreased	17.8	4.8*	20.6	7.6*
		Platelets decreased	10.1*	4.1*	26.6*	12.7*
Nervous system disorders	Common	Neuropathy-sensory	8.5*	0.0*	12.4*	0.6*
		Taste disturbance	8.1	0.0***	8.9	0.0***
Gastrointestinal disorders	Very common	Nausea	56.1	7.2*	53.4	3.9*
		Vomiting	39.7	6.1	35.5	6.1
		Anorexia	26.6	2.4*	24.2	0.7*
		Constipation	21.0	0.8	19.5	0.4
		Stomatitis/Pharyngitis	13.5	0.8	12.4	0.1
	Diarrhoea without colostomy	12.4	1.3	12.8	1.6	
	Common	Dyspepsia/heartburn	5.2	0.1	5.9	0.0
Skin and subcutaneous tissue disorders	Very common	Alopecia	11.9*	0***	21.4*	0.5***
	Common	Rash/desquamation	6.6	0.1	8.0	0.5
Renal and urinary disorders	Very common	Creatinine elevation	10.1*	0.8	6.9*	0.5
General disorders and administration site conditions	Very common	Fatigue	42.7	6.7	44.9	4.9

\*p-values < 0.05 comparing pemetrexed/cisplatin to gemcitabine/cisplatin, using Fisher Exact test.  
\*\*Refer to National Cancer Institute CTC (v2.0; NCI 1998) for each Grade of Toxicity.  
\*\*\*According to National Cancer Institute CTC (v2.0; NCI 1998), taste disturbance and alopecia should only be reported as Grade 1 or 2.

For the purpose of this table, a cut off of 5% was used for inclusion of all events where the reporter considered a possible relationship to pemetrexed and cisplatin.

Clinically relevant toxicity that was reported in  $\geq 1\%$  and  $\leq 5\%$  of the patients that were randomly assigned to receive cisplatin and pemetrexed include: AST increase, ALT increase, infection, febrile neutropenia, renal failure, pyrexia, dehydration, conjunctivitis, and creatinine clearance decrease.

Clinically relevant toxicity that was reported in  $< 1\%$  of the patients that were randomly assigned to receive cisplatin and pemetrexed include: GGT increase, chest pain, arrhythmia, and motor neuropathy.

Clinically relevant toxicities with respect to gender were similar to the overall population in patients receiving pemetrexed plus cisplatin.

The table below provides the frequency and severity of undesirable effects considered possibly related to study medicinal product that have been reported in  $> 5\%$  of 800 patients randomly assigned to receive single-agent pemetrexed and 402 patients randomly assigned to receive placebo in the single-agent pemetrexed maintenance (JMEN: N= 663) and continuation pemetrexed maintenance (PARAMOUNT: N=539) studies. All patients were diagnosed with Stage IIIB or IV NSCLC and had

received prior platinum-based chemotherapy. Patients in both study arms were fully supplemented with folic acid and vitamin B<sub>12</sub>.

System organ class	Frequency*	Event**	pemetrexed*** (N = 800)		Placebo*** (N = 402)	
			All grades toxicity (%)	Grade 3 - 4 toxicity (%)	All grades toxicity (%)	Grade 3 - 4 toxicity (%)
Blood and lymphatic system disorders	Very common	Haemoglobin decreased	18.0	4.5	5.2	0.5
	Common	Leucocytes decreased	5.8	1.9	0.7	0.2
		Neutrophils decreased	8.4	4.4	0.2	0.0
Nervous system disorders	Common	Neuropathy-sensory	7.4	0.6	5.0	0.2
Gastrointestinal disorders	Very common	Nausea	17.3	0.8	4.0	0.2
		Anorexia	12.8	1.1	3.2	0.0
	Common	Vomiting	8.4	0.3	1.5	0.0
		Mucositis/Stomatitis	6.8	0.8	1.7	0.0
Hepatobiliary disorders	Common	ALT (SGPT) elevation	6.5	0.1	2.2	0.0
		AST (SGOT) elevation	5.9	0.0	1.7	0.0
Skin and subcutaneous tissue disorders	Common	Rash/desquamation	8.1	0.1	3.7	0.0
General disorders and administration site conditions	Very common	Fatigue	24.1	5.3	10.9	0.7
	Common	Pain	7.6	0.9	4.5	0.0
		Oedema	5.6	0.0	1.5	0.0
Renal Disorders	Common	Renal disorders****	7.6	0.9	1.7	0.0

Abbreviations: ALT = alanine aminotransferase; AST = aspartate aminotransferase; CTCAE = Common Terminology Criteria for Adverse Event; NCI = National Cancer Institute; SGOT = serum glutamic oxaloacetic aminotransferase; SGPT = serum glutamic pyruvic aminotransferase.

\*Definition of frequency terms: Very common -  $\geq 10\%$ ; Common -  $> 5\%$  and  $< 10\%$ . For the purpose of this table, a cut off of 5% was used for inclusion of all events where the reporter considered a possible relationship to pemetrexed.

\*\*Refer to NCI CTCAE Criteria (Version 3.0; NCI 2003) for each grade of toxicity. The reporting rates shown are according to CTCAE version 3.0.

\*\*\*Integrated adverse reactions table combines the results of the JMEN pemetrexed maintenance (N=663) and PARAMOUNT continuation pemetrexed maintenance (N=539) studies.

\*\*\*\* Combined term includes increased serum/blood creatinine, decreased glomerular filtration rate, renal failure and renal/genitourinary- other.

Clinically relevant CTC toxicity of any grade that was reported in  $\geq 1\%$  and  $\leq 5\%$  of the patients that were randomly assigned to pemetrexed include: febrile neutropenia, infection, decreased platelets, diarrhoea, constipation, alopecia, pruritus/itching, fever (in the absence of neutropenia), ocular surface disease (including conjunctivitis), increased lacrimation, dizziness and motor neuropathy.

Clinically relevant CTC toxicity that was reported in  $< 1\%$  of the patients that were randomly assigned to pemetrexed include: allergic reaction/hypersensitivity, erythema multiforme, supraventricular arrhythmia and pulmonary embolism.

Safety was assessed for patients who were randomised to receive pemetrexed (N=800). The incidence of adverse reactions was evaluated for patients who received  $\leq 6$  cycles of pemetrexed maintenance (N=519), and compared to patients who received  $>6$  cycles of pemetrexed (N=281). Increases in adverse reactions (all grades) were observed with longer exposure. A significant increase in the incidence of possibly study-medicinal product-related Grade 3/4 neutropenia was observed with longer exposure to pemetrexed ( $\leq 6$  cycles: 3.3%,  $>6$  cycles: 6.4%;  $p=0.046$ ). No statistically significant differences in any other individual Grade 3/4/5 adverse reactions were seen with longer exposure.

Serious cardiovascular and cerebrovascular events, including myocardial infarction, angina pectoris, cerebrovascular accident, and transient ischaemic attack, have been uncommonly reported during clinical studies with pemetrexed, usually when given in combination with another cytotoxic agent. Most of the patients in whom these events have been observed had pre-existing cardiovascular risk factors.

Rare cases of hepatitis, potentially serious, have been reported during clinical studies with pemetrexed.

Pancytopenia has been uncommonly reported during clinical trials with pemetrexed.

In clinical trials, cases of colitis (including intestinal and rectal bleeding, sometimes fatal, intestinal perforation, intestinal necrosis and typhlitis) have been reported uncommonly in patients treated with pemetrexed.

In clinical trials, cases of interstitial pneumonitis with respiratory insufficiency, sometimes fatal, have been reported uncommonly in patients treated with pemetrexed.

Uncommon cases of oedema have been reported in patients treated with pemetrexed.

Oesophagitis/ radiation oesophagitis has been uncommonly reported during clinical trials with pemetrexed.

Sepsis, sometimes fatal, has been commonly reported during clinical trials with pemetrexed.

During post-marketing surveillance, the following adverse reactions have been reported in patients treated with pemetrexed:

Uncommon cases of acute renal failure have been reported with pemetrexed alone or in association with other chemotherapeutic agents (see section 4.4). Nephrogenic diabetes insipidus and renal tubular necrosis have been reported in post marketing setting with an unknown frequency.

Uncommon cases of radiation pneumonitis have been reported in patients treated with radiation either prior, during or subsequent to their pemetrexed therapy (see section 4.4).

Rare cases of radiation recall have been reported in patients who have received radiotherapy previously (see section 4.4).

Uncommon cases of peripheral ischaemia leading sometimes to extremity necrosis have been reported.

Rare cases of bullous conditions have been reported including Stevens-Johnson syndrome and Toxic epidermal necrolysis which in some cases were fatal.

Rarely, immune-mediated haemolytic anaemia has been reported in patients treated with pemetrexed.

Rare cases of anaphylactic shock have been reported.

Erythematous oedema mainly of the lower limbs has been reported with an unknown frequency.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in Appendix V.

## **4.9 Overdose**

Reported symptoms of overdose include neutropenia, anaemia, thrombocytopenia, mucositis, sensory polyneuropathy, and rash. Anticipated complications of overdose include bone marrow suppression as manifested by neutropenia, thrombocytopenia, and anaemia. In addition, infection with or without fever, diarrhoea, and/or mucositis may be seen. In the event of suspected overdose, patients should be monitored with blood counts and should receive supportive therapy as necessary. The use of calcium folinate/folinic acid in the management of pemetrexed overdose should be considered.

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: antineoplastic agents, folic acid analogues. ATC code: L01BA04.

Pemetrexed is a multi-targeted anti-cancer antifolate agent that exerts its action by disrupting crucial folate-dependent metabolic processes essential for cell replication.

*In vitro* studies have shown that pemetrexed behaves as a multi-targeted antifolate by inhibiting thymidylate synthase (TS), dihydrofolate reductase (DHFR), and glycinamide ribonucleotide formyltransferase (GARFT), which are key folate-dependent enzymes for the *de novo* biosynthesis of thymidine and purine nucleotides. Pemetrexed is transported into cells by both the reduced folate carrier and membrane folate binding protein transport systems. Once in the cell, pemetrexed is rapidly and efficiently converted to polyglutamate forms by the enzyme folylpolyglutamate synthetase. The polyglutamate forms are retained in cells and are even more potent inhibitors of TS and GARFT. Polyglutamation is a time- and concentration-dependent process that occurs in tumour cells and, to a lesser extent, in normal tissues. Polyglutamated metabolites have an increased intracellular half-life resulting in prolonged drug action in malignant cells.

### Clinical efficacy

#### Mesothelioma

EMPHACIS, a multi-centre, randomised, single-blind Phase 3 study of pemetrexed plus cisplatin versus cisplatin in chemo-naïve patients with malignant pleural mesothelioma, has shown that patients treated with pemetrexed and cisplatin had a clinically meaningful 2.8-month median survival advantage over patients receiving cisplatin alone.

During the study, low-dose folic acid and vitamin B<sub>12</sub> supplementation was introduced to patients' therapy to reduce toxicity. The primary analysis of this study was performed on the population of all patients randomly assigned to a treatment arm who received study drug (randomised and treated). A subgroup analysis was performed on patients who received folic acid and vitamin B<sub>12</sub> supplementation during the entire course of study therapy (fully supplemented). The results of these analyses of efficacy are summarised in the table below.

## Efficacy of pemetrexed plus cisplatin vs. cisplatin in malignant pleural mesothelioma

Efficacy parameter	Randomised and treated patients		Fully supplemented patients	
	pemetrexed / cisplatin (N = 226)	cisplatin (N = 222)	pemetrexed / cisplatin (N = 168)	cisplatin (N = 163)
Median overall survival (months)	12.1	9.3	13.3	10.0
(95% CI)	(10.0-14.4)	(7.8-10.7)	(11.4-14.9)	(8.4-11.9)
Log rank <i>p</i> -value*	0.020		0.051	
Median time to tumour progression (months)	5.7	3.9	6.1	3.9
(95% CI)	(4.9-6.5)	(2.8-4.4)	(5.3-7.0)	(2.8-4.5)
Log rank <i>p</i> -value*	0.001		0.008	
Time to treatment failure (months)	4.5	2.7	4.7	2.7
(95% CI)	(3.9-4.9)	(2.1-2.9)	(4.3-5.6)	(2.2-3.1)
Log rank <i>p</i> -value*	0.001		0.001	
Overall response rate**	41.3%	16.7%	45.5%	19.6%
(95% CI)	(34.8-48.1)	(12.0-22.2)	(37.8-53.4)	(13.8-26.6)
Fisher's exact <i>p</i> -value*	<0.001		<0.001	

Abbreviation: CI = confidence interval.  
 \**p*-value refers to comparison between arms.  
 \*\*In the pemetrexed /cisplatin arm, randomised and treated (N=225) and fully supplemented (N=167).

A statistically significant improvement of the clinically relevant symptoms (pain and dyspnoea) associated with malignant pleural mesothelioma in the pemetrexed /cisplatin arm (212 patients) versus the cisplatin arm alone (218 patients) was demonstrated using the Lung Cancer Symptom Scale. Statistically significant differences in pulmonary function tests were also observed. The separation between the treatment arms was achieved by improvement in lung function in the pemetrexed /cisplatin arm and deterioration of lung function over time in the control arm.

There are limited data in patients with malignant pleural mesothelioma treated with pemetrexed alone. Pemetrexed at a dose of 500 mg/m<sup>2</sup> was studied as a single agent in 64 chemonaive patients with malignant pleural mesothelioma. The overall response rate was 14.1%.

### NSCLC, second-line treatment

A multi-centre, randomised, open-label Phase-3 study of pemetrexed versus docetaxel in patients with locally advanced or metastatic NSCLC after prior chemotherapy has shown median survival times of 8.3 months for patients treated with pemetrexed (Intent-To-Treat [ITT] population N = 283) and 7.9 months for patients treated with docetaxel (ITT N = 288). Prior chemotherapy did not include pemetrexed. An analysis of the impact of NSCLC histology on the treatment effect on overall survival was in favour of pemetrexed versus docetaxel for other than predominantly squamous histologies (N = 399, 9.3 versus 8.0 months, (HR) = 0.78; 95% CI = 0.61-1.00, *p* = 0.047) and was in favour of docetaxel for squamous cell carcinoma histology (N = 172, 6.2 versus 7.4 months, adjusted HR = 1.56; 95% CI = 1.08-2.26, *p* = 0.018). There were no clinically relevant differences observed for the safety profile of pemetrexed within the histology subgroups.

Limited clinical data from a separate randomised, Phase-3, controlled trial, suggest that efficacy data (overall survival, progression-free survival) for pemetrexed are similar between patients previously pre-treated with docetaxel (N = 41) and patients who did not receive previous docetaxel treatment (N = 540).

## Efficacy of pemetrexed vs. docetaxel in NSCLC - ITT population

	<b>pemetrexed</b>	<b>docetaxel</b>
<b>Survival time (months)</b>	(N = 283)	(N = 288)
• Median (m)	8.3	7.9
• 95% CI for median	(7.0-9.4)	(6.3-9.2)
• HR	0.99	
• 95% CI for HR	(0.82-1.20)	
• Non-inferiority <i>p</i> -value (HR)	0.226	
<b>Progression-free survival (months)</b>	(N = 283)	(N = 288)
• Median	2.9	2.9
• HR (95% CI)	0.97 (0.82-1.16)	
<b>Time to treatment failure (TTTF - months)</b>	(N = 283)	(N = 288)
• Median	2.3	2.1
• HR (95% CI)	0.84 (0.71-0.997)	
<b>Response (n: qualified for response)</b>	(N = 264)	(N = 274)
• Response rate (%) (95% CI)	9.1 (5.9-13.2)	8.8 (5.7-12.8)
• Stable disease (%)	45.8	46.4
Abbreviations: CI = confidence interval; HR = hazard ratio; ITT = intent-to-treat; N = total population size.		

### *NSCLC, first-line treatment*

A multi-centre, randomised, open-label, Phase-3 study of pemetrexed plus cisplatin versus gemcitabine plus cisplatin in chemo-naïve patients with locally advanced or metastatic (Stage IIIb or IV) non-small cell lung cancer (NSCLC) showed that pemetrexed plus cisplatin (Intent-To-Treat [ITT] population N = 862) met its primary endpoint and showed similar clinical efficacy as gemcitabine plus cisplatin (ITT N = 863) in overall survival (HR 0.94; 95% CI= 0.84-1.05). All patients included in this study had an ECOG performance status 0 or 1.

The primary efficacy analysis was based on the ITT population. Sensitivity analyses of main efficacy endpoints were also assessed on the Protocol Qualified (PQ) population. The efficacy analyses using PQ population are consistent with the analyses for the ITT population and support the non-inferiority of AC versus GC.

Progression-free survival (PFS) and overall response rate were similar between treatment arms: median PFS was 4.8 months for pemetrexed plus cisplatin versus 5.1 months for gemcitabine plus cisplatin (adjusted hazard ratio (HR) 1.04; 95% CI= 0.94-1.15), and overall response rate was 30.6% (95% CI= 27.3- 33.9) for pemetrexed plus cisplatin versus 28.2% (95% CI= 25.0-31.4) for gemcitabine plus cisplatin. PFS data were partially confirmed by an independent review (400/1725 patients were randomly selected for review).

The analysis of the impact of NSCLC histology on overall survival demonstrated clinically relevant differences in survival according to histology, see table below.

### **Efficacy of pemetrexed + cisplatin vs. gemcitabine + cisplatin in first-line non-small cell lung cancer – ITT population and histology subgroups**

ITT population and histology subgroups	Median overall survival in months (95% CI)				Adjusted hazard ratio (HR) (95% CI)	Superiority <i>p</i> -value
	pemetrexed + cisplatin		gemcitabine + cisplatin			
ITT population (N = 1725)	10.3 (9.8 – 11.2)	N = 862	10.3 (9.6 – 10.9)	N = 863	0.94 <sup>a</sup> (0.84 – 1.05)	0.259
Adenocarcinoma <sup>a</sup> (N = 847)	12.6 (10.7 – 13.6)	N = 436	10.9 (10.2 – 11.9)	N = 411	0.84 (0.71–0.99)	0.033

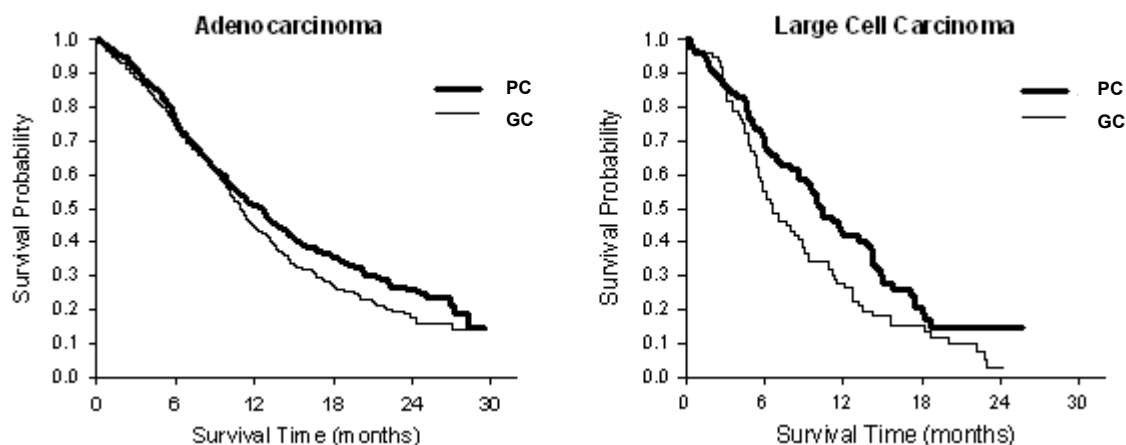


ITT population and histology	Median overall survival in months (95% CI)				Adjusted hazard ratio	Superiority <i>p</i> -
		N		N		
Large cell (N = 153)	10.4 (8.6 – 14.1)	N = 76	6.7 (5.5 – 9.0)	N = 77	0.67 (0.48–0.96)	0.027
Other (N = 252)	8.6 (6.8 – 10.2)	N = 106	9.2 (8.1 – 10.6)	N = 146	1.08 (0.81–1.45)	0.586
Squamous cell (N = 473)	9.4 (8.4 – 10.2)	N = 244	10.8 (9.5 – 12.1)	N = 229	1.23 (1.00–1.51)	0.050

Abbreviations: CI = confidence interval; ITT = intent-to-treat; N = total population size.

<sup>a</sup> Statistically significant for non-inferiority, with the entire confidence interval for HR well below the 1.17645 non-inferiority margin ( $p < 0.001$ ).

### Kaplan-Meier plots of overall survival by histology



There were no clinically relevant differences observed for the safety profile of pemetrexed plus cisplatin within the histology subgroups.

Patients treated with pemetrexed and cisplatin required fewer transfusions (16.4% versus 28.9%,  $p < 0.001$ ), red blood cell transfusions (16.1% versus 27.3%,  $p < 0.001$ ) and platelet transfusions (1.8% versus 4.5%,  $p = 0.002$ ). Patients also required lower administration of erythropoietin/darbopoietin (10.4% versus 18.1%,  $p < 0.001$ ), G-CSF/GM-CSF (3.1% versus 6.1%,  $p = 0.004$ ), and iron preparations (4.3% versus 7.0%,  $p = 0.021$ ).

### NSCLC, maintenance treatment

#### *JMEN*

A multi-centre, randomised, double-blind, placebo-controlled Phase-3 study (JMEN), compared the efficacy and safety of maintenance treatment with pemetrexed plus best supportive care (BSC) (N = 441) with that of placebo plus BSC (N = 222) in patients with locally advanced (Stage IIIB) or metastatic (Stage IV) Non-Small Cell Lung Cancer (NSCLC) who did not progress after 4 cycles of first-line doublet therapy containing cisplatin or carboplatin in combination with gemcitabine, paclitaxel, or docetaxel. First-line doublet therapy containing pemetrexed was not included. All patients included in this study had an ECOG performance status 0 or 1. Patients received maintenance treatment until disease progression. Efficacy and safety were measured from the time of randomisation after completion of first-line (induction) therapy. Patients received a median of 5 cycles of maintenance treatment with pemetrexed and 3.5 cycles of placebo. A total of 213 patients (48.3%) completed  $\geq 6$  cycles and a total of 103 patients (23.4%) completed  $\geq 10$  cycles of treatment with pemetrexed.

The study met its primary endpoint and showed a statistically significant improvement in PFS in the pemetrexed arm over the placebo arm (N = 581, independently reviewed population; median of 4.0 months and 2.0 months, respectively) (hazard ratio = 0.60, 95% CI = 0.49-0.73,  $p < 0.00001$ ). The independent review of patient scans confirmed the findings of the investigator assessment of PFS. The

median OS for the overall population (N = 663) was 13.4 months for the pemetrexed arm and 10.6 months for the placebo arm, hazard ratio = 0.79 (95% CI= 0.65-0.95, p = 0.01192).

Consistent with other pemetrexed studies, a difference in efficacy according to NSCLC histology was observed in JMEN. For patients with NSCLC other than predominantly squamous cell histology (N = 430, independently reviewed population) median PFS was 4.4 months for the pemetrexed arm and 1.8 months for the placebo arm, hazard ratio = 0.47 (95% CI = 0.37-0.60, p = 0.00001). The median OS for patients with NSCLC other than predominantly squamous cell histology (N = 481) was 15.5 months for the pemetrexed arm and 10.3 months for the placebo arm, hazard ratio = 0.70 (95% CI = 0.56-0.88, p = 0.002). Including the induction phase, the median OS for patients with NSCLC other than predominantly squamous cell histology was 18.6 months for the pemetrexed arm and 13.6 months for the placebo arm, hazard ratio = 0.71 (95% CI = 0.56-0.88, p = 0.002).

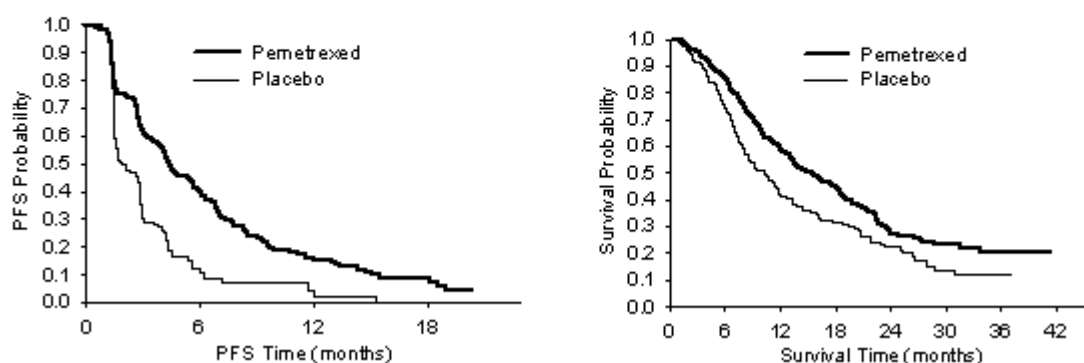
The PFS and OS results in patients with squamous cell histology suggested no advantage for pemetrexed over placebo.

There were no clinically relevant differences observed for the safety profile of pemetrexed within the histology subgroups.

### **JMEN: Kaplan-Meier plots of progression-free survival (PFS) and overall survival pemetrexed versus placebo in patients with NSCLC other than predominantly squamous cell histology:**

**Progression-Free Survival**

**Overall Survival**



### **PARAMOUNT**

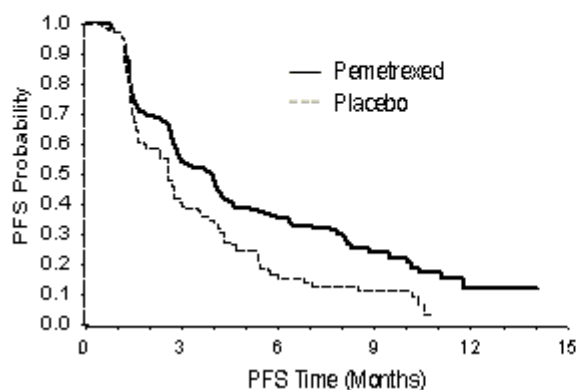
A multi-centre, randomised, double-blind, placebo-controlled Phase-3 study (PARAMOUNT), compared the efficacy and safety of continuation maintenance treatment with pemetrexed plus BSC (N = 359) with that of placebo plus BSC (N = 180) in patients with locally advanced (Stage IIIB) or metastatic (Stage IV) NSCLC other than predominantly squamous cell histology who did not progress after 4 cycles of first-line doublet therapy of pemetrexed in combination with cisplatin. Of the 939 patients treated with pemetrexed plus cisplatin induction, 539 patients were randomised to maintenance treatment with pemetrexed or placebo. Of the randomised patients, 44.9% had a complete/partial response and 51.9% had a response of stable disease to pemetrexed plus cisplatin induction. Patients randomised to maintenance treatment were required to have an ECOG performance status 0 or 1. The median time from the start of pemetrexed plus cisplatin induction therapy to the start of maintenance treatment was 2.96 months on both the pemetrexed arm and the placebo arm. Randomised patients received maintenance treatment until disease progression. Efficacy and safety were measured from the time of randomisation after completion of first-line (induction) therapy. Patients received a median of 4 cycles of maintenance treatment with pemetrexed and 4 cycles of placebo. A total of 169 patients (47.1%) completed  $\geq 6$  cycles maintenance treatment with pemetrexed, representing at least 10 total cycles of pemetrexed.

The study met its primary endpoint and showed a statistically significant improvement in PFS in the pemetrexed arm over the placebo arm (N = 472, independently reviewed population; median of 3.9 months and 2.6 months, respectively) (hazard ratio = 0.64, 95% CI = 0.51-0.81, p = 0.0002). The independent review of patient scans confirmed the findings of the investigator assessment of PFS. For randomised patients, as measured from the start of pemetrexed plus cisplatin first-line induction treatment, the median investigator-assessed PFS was 6.9 months for the pemetrexed arm and 5.6 months for the placebo arm (hazard ratio = 0.59, 95% CI = 0.47-0.74).

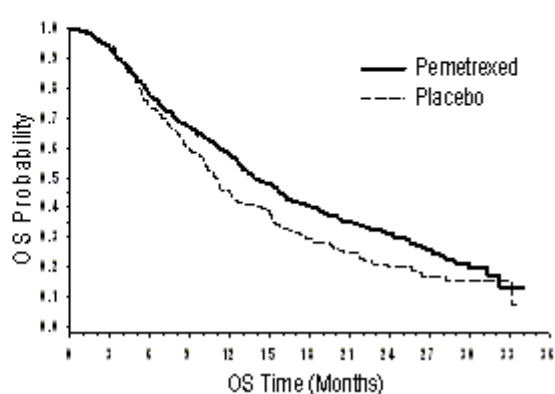
Following pemetrexed plus cisplatin induction (4 cycles), treatment with pemetrexed was statistically superior to placebo for OS (median 13.9 months versus 11.0 months, hazard ratio = 0.78, 95%CI=0.64-0.96, p=0.0195). At the time of this final survival analysis, 28.7% of patients were alive or lost to follow up on the pemetrexed arm versus 21.7% on the placebo arm. The relative treatment effect of pemetrexed was internally consistent across subgroups (including disease stage, induction response, ECOG PS, smoking status, gender, histology and age) and similar to that observed in the unadjusted OS and PFS analyses. The 1 year and 2 year survival rates for patients on pemetrexed were 58% and 32% respectively, compared to 45% and 21% for patients on placebo. From the start of pemetrexed plus cisplatin first-line induction treatment, the median OS of patients was 16.9 months for the pemetrexed arm and 14.0 months for the placebo arm (hazard ratio= 0.78, 95% CI = 0.64-0.96). The percentage of patients that received post-study treatment was 64.3% for pemetrexed and 71.7% for placebo.

**PARAMOUNT: Kaplan-Meier plot of progression-free survival (PFS) and Overall Survival (OS) for continuation pemetrexed maintenance versus placebo in patients with NSCLC other than predominantly squamous cell histology (measured from randomisation)**

Progression Free Survival



Overall Survival



The pemetrexed maintenance safety profiles from the two studies JMEN and PARAMOUNT were similar.

The European Medicines Agency has waived the obligation to submit the results of studies with the reference medicinal product containing pemetrexed in all subsets of the paediatric population for the granted indications (see section 4.2 for information on paediatric use).

**5.2 Pharmacokinetic properties**

The pharmacokinetic properties of pemetrexed following single-agent administration have been evaluated in 426 cancer patients with a variety of solid tumours at doses ranging from 0.2 to 838 mg/m<sup>2</sup> infused over a 10 minute period. Pemetrexed has a steady-state volume of distribution of 9 l/m<sup>2</sup>. *In vitro* studies indicate that pemetrexed is approximately 81% bound to plasma proteins. Binding was not notably affected by varying degrees of renal impairment. Pemetrexed undergoes

limited hepatic metabolism. Pemetrexed is primarily eliminated in the urine, with 70% to 90% of the administered dose being recovered unchanged in urine within the first 24 hours following administration. *In vitro* studies indicate that pemetrexed is actively secreted by OAT3 (organic anion transporter).

Pemetrexed total systemic clearance is 91.8 ml/min and the elimination half-life from plasma is 3.5 hours in patients with normal renal function (creatinine clearance of 90 ml/min). Between-patient variability in clearance is moderate at 19.3%. Pemetrexed total systemic exposure (AUC) and maximum plasma concentration increase proportionally with dose. The pharmacokinetics of pemetrexed are consistent over multiple treatment cycles.

The pharmacokinetic properties of pemetrexed are not influenced by concurrently administered cisplatin. Oral folic acid and intramuscular vitamin B<sub>12</sub> supplementation do not affect the pharmacokinetics of pemetrexed.

### **5.3 Preclinical safety data**

Administration of pemetrexed to pregnant mice resulted in decreased foetal viability, decreased foetal weight, incomplete ossification of some skeletal structures, and cleft palate.

Administration of pemetrexed to male mice resulted in reproductive toxicity characterised by reduced fertility rates and testicular atrophy. In a study conducted in beagle dog by intravenous bolus injection for 9 months, testicular findings (degeneration/necrosis of the seminiferous epithelium) have been observed. This suggests that pemetrexed may impair male fertility. Female fertility was not investigated.

Pemetrexed was not mutagenic in either the *in vitro* chromosome aberration test in Chinese hamster ovary cells, or the Ames test. Pemetrexed has been shown to be clastogenic in the *in vivo* micronucleus test in the mouse.

Studies to assess the carcinogenic potential of pemetrexed have not been conducted.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

Mannitol E 421

### **6.2 Incompatibilities**

Pemetrexed is physically incompatible with diluents containing calcium, including lactated Ringer's injection and Ringer's injection. In the absence of other compatibility studies this medicinal product must not be mixed with other medicinal products.

### **6.3 Shelf life**

Unopened vial

Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion  
18 months

Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion  
2 years

Pemetrexed Hospira UK Limited 1,000mg powder for concentrate for solution for infusion  
2 years

#### Reconstituted and infusion solutions

Chemical and physical in-use stability of reconstituted and infusion solutions of Pemetrexed Hospira UK Limited were demonstrated for 24 hours at refrigerated temperature and 25°C.

From a microbiological point of view, the product should be used immediately. If not used immediately, in use storage times and conditions prior to use are the responsibility of the user and would normally not be longer than 24 hours at 2°C to 8°C.

#### **6.4 Special precautions for storage**

Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion  
Store below 30°C.

Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion  
This medicinal product does not require any special storage conditions.

Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion  
This medicinal product does not require any special storage conditions.

For storage conditions after reconstitution of the medicinal product, see section 6.3.

#### **6.5 Nature and contents of container**

Type I glass vial with bromobutyl rubber stopper containing 100 mg, 500 mg or 1,000 mg of pemetrexed

Pack of 1 vial.

#### **6.6 Special precautions for disposal and other handling**

1. Use aseptic technique during the reconstitution and further dilution of pemetrexed for intravenous infusion administration.
2. Calculate the dose and the number of Pemetrexed Hospira UK Limited vials needed. Each vial contains an excess of pemetrexed to facilitate delivery of label amount.
3. Pemetrexed Hospira UK Limited must only be reconstituted with sterile water for injections.

Reconstitute 100 mg vials with 4.2 ml of sterile water for injections, resulting in a solution containing 25 mg/ml pemetrexed. Gently swirl each vial until the powder is completely dissolved. The resulting solution is clear and ranges in colour from colourless to yellow or green-yellow without adversely affecting product quality. The pH of the reconstituted solution is between 5.7 and 7.7. **Further dilution is required, as below.**

Reconstitute 500 mg vials with 20 ml of sterile water for injections, resulting in a solution containing 25 mg/ml pemetrexed. Gently swirl each vial until the powder is completely dissolved. The resulting solution is clear and ranges in colour from colourless to yellow or green-yellow without adversely affecting product quality. The pH of the reconstituted solution is between 5.7 and 7.7. **Further dilution is required, as below.**

Reconstitute 1000 mg vials with 40 ml of sterile water for injections resulting in a solution containing 25 mg/ml pemetrexed. Gently swirl each vial until the powder is completely dissolved. The resulting

solution is clear and ranges in colour from colourless to yellow or green-yellow without adversely affecting product quality. The pH of the reconstituted solution is between 5.7 and 7.7. **Further dilution is required, as below.**

4. The appropriate volume of reconstituted pemetrexed solution must be further diluted to 100 ml with 5% glucose solution for injection, without preservative, and administered as an intravenous infusion over 10 minutes.

5. Pemetrexed infusion solutions prepared as directed above are compatible with polyvinyl chloride- and polyolefin- lined administration sets and infusion bags.

6. Parenteral medicinal products must be inspected visually for particulate matter and discolouration prior to administration. If particulate matter is observed, do not administer.

7. Pemetrexed solutions are for single use only.

Any unused medicinal product or waste material must be disposed of in accordance with local requirements.

#### Preparation and administration precautions

As with other potentially toxic anti-cancer agents, care should be exercised in the handling and preparation of pemetrexed infusion solutions. The use of gloves is recommended. If a pemetrexed solution contacts the skin, wash the skin immediately and thoroughly with soap and water. If pemetrexed solutions contact the mucous membranes, flush thoroughly with water. Pemetrexed is not a vesicant. There is not a specific antidote for extravasation of pemetrexed. There have been few reported cases of pemetrexed extravasation, which were not assessed as serious by the investigator. Extravasation should be managed by local standard practice as with other non-vesicants.

## **7. MARKETING AUTHORISATION HOLDER**

Hospira UK Limited  
Horizon  
Honey Lane  
Hurley  
Maidenhead  
SL6 6RJ  
United Kingdom

## **8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/17/1183/001  
EU/1/17/1183/002  
EU/1/17/1183/003

## **9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

24 April 2017

## **10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>

## **ANNEX II**

- A. MANUFACTURER(S) RESPONSIBLE FOR BATCH RELEASE**
- B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE**
- C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION**
- D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT**

A. MANUFACTURER(S) RESPONSIBLE FOR BATCH RELEASE

Name and address of the manufacturer responsible for batch release

Hospira UK Limited  
Horizon, Honey Lane  
Hurley  
Maidenhead  
SL6 6RJ  
United Kingdom

B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE Medicinal product subject to restricted medical prescription (see Annex I: Summary of Product Characteristics, 4.2)

C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION

- **Periodic safety update reports**

The requirements for submission of periodic safety update reports for this medicinal product are set out in the list of Union reference dates (EURD list) provided for under Article 107c(7) of Directive 2001/83/EC and any subsequent updates published on the European medicines web-portal.

D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT

- **Risk Management Plan (RMP)**

The MAH shall perform the required pharmacovigilance activities and interventions detailed in the agreed RMP presented in Module 1.8.2 of the marketing authorisation and any agreed subsequent updates of the RMP.

An updated RMP should be submitted:

- At the request of the European Medicines Agency;
- Whenever the risk management system is modified, especially as the result of new information being received that may lead to a significant change to the benefit/risk profile or as the result of an important (pharmacovigilance or risk minimisation) milestone being reached.



**ANNEX III**  
**LABELLING AND PACKAGE LEAFLET**

## A. LABELLING

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER CARTON 100 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion  
pemetrexed

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each vial contains 100 mg of pemetrexed (as pemetrexed ditromethamine)

After reconstitution, each vial contains 25 mg/ml of pemetrexed

**3. LIST OF EXCIPIENTS**

Contains mannitol

**4. PHARMACEUTICAL FORM AND CONTENTS**

Powder for concentrate for solution for infusion  
100 mg  
1 vial

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

For intravenous use after reconstitution and dilution

Read the package leaflet before use.

Single use only

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

Cytotoxic

**8. EXPIRY DATE**

EXP

Read the package leaflet for the shelf life of the reconstituted product.

**9. SPECIAL STORAGE CONDITIONS**

Store below 30°C

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

Discard unused contents appropriately

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Hospira UK Limited  
Hurley  
SL6 6RJ  
United Kingdom

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/17/1183/001

**13. BATCH NUMBER**

BN

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted

**17. UNIQUE IDENTIFIER- 2D BARCODE**

2D barcode carrying the unique identifier included

**18. UNIQUE IDENTIFIER- HUMAN READABLE DATA**

PC:  
SN:  
NN:

**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL 100 mg**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion  
pemetrexed  
IV

**2. METHOD OF ADMINISTRATION**

Reconstitute and dilute before use  
See leaflet.

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

BN

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

100 mg

**6. OTHER**

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER CARTON 500 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion  
pemetrexed

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each vial contains 500 mg of pemetrexed (as pemetrexed ditromethamine)

After reconstitution each vial contains 25 mg/ml of pemetrexed

**3. LIST OF EXCIPIENTS**

Contains mannitol

**4. PHARMACEUTICAL FORM AND CONTENTS**

Powder for concentrate for solution for infusion  
500 mg  
1 vial

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

For intravenous use after reconstitution and dilution

Read the package leaflet before use.

Single use only

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

Cytotoxic

**8. EXPIRY DATE**

EXP

Read the package leaflet for the shelf life of the reconstituted product.

**9. SPECIAL STORAGE CONDITIONS**

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

Discard unused contents appropriately

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Hospira UK Limited  
Hurley,  
SL6 6RJ  
United Kingdom

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/17/1183/002

**13. BATCH NUMBER**

BN

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted

**17. UNIQUE IDENTIFIER- 2D BARCODE**

2D barcode carrying the unique identifier included

**18. UNIQUE IDENTIFIER- HUMAN READABLE DATA**

PC:  
SN:  
NN:



**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL 500 mg**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion  
pemetrexed  
IV

**2. METHOD OF ADMINISTRATION**

Reconstitute and dilute before use  
See leaflet.

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

BN

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

500 mg

**6. OTHER**

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**OUTER CARTON 1,000 mg**

**1. NAME OF THE MEDICINAL PRODUCT**

Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion  
pemetrexed

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each vial contains 1,000 mg of pemetrexed (as pemetrexed ditromethamine)  
After reconstitution each vial contains 25 mg/ml of pemetrexed

**3. LIST OF EXCIPIENTS**

Contains mannitol

**4. PHARMACEUTICAL FORM AND CONTENTS**

Powder for concentrate for solution for infusion  
1,000 mg  
1 vial

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

For intravenous use after reconstitution and dilution

Read the package leaflet before use.

Single use only

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

Cytotoxic

**8. EXPIRY DATE**

EXP

Read the package leaflet for the shelf life of the reconstituted product.

**9. SPECIAL STORAGE CONDITIONS**

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

Discard unused contents appropriately

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

Hospira UK Limited  
Hurley,  
SL6 6RJ  
United Kingdom

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/17/1183/003

**13. BATCH NUMBER**

BN

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted

**17. UNIQUE IDENTIFIER- 2D BARCODE**

2D barcode carrying the unique identifier included

**18. UNIQUE IDENTIFIER- HUMAN READABLE DATA**

PC:  
SN:  
NN:

**PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL 1,000 mg**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion  
pemetrexed  
IV

**2. METHOD OF ADMINISTRATION**

Reconstitute and dilute before use  
See leaflet.

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

BN

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

1,000 mg

**6. OTHER**

## B. PACKAGE LEAFLET

## Package leaflet: Information for the user

**Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion**  
**Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion**  
**Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion**  
pemetrexed

**Read all of this leaflet carefully before you start receiving this medicine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

### What is in this leaflet

1. What Pemetrexed Hospira UK Limited is and what it is used for
2. What you need to know before you use Pemetrexed Hospira UK Limited
3. How to use Pemetrexed Hospira UK Limited
4. Possible side effects
5. How to store Pemetrexed Hospira UK Limited
6. Contents of the pack and other information

#### 1. What Pemetrexed Hospira UK Limited is and what it is used for

Pemetrexed Hospira UK Limited is a medicine used in the treatment of cancer.

Pemetrexed Hospira UK Limited is given in combination with cisplatin, another anti-cancer medicine, as treatment for malignant pleural mesothelioma, a form of cancer that affects the lining of the lung, to patients who have not received prior chemotherapy.

Pemetrexed Hospira UK Limited is also given in combination with cisplatin for the initial treatment of patients with advanced stage of lung cancer.

Pemetrexed Hospira UK Limited can be prescribed to you if you have lung cancer at an advanced stage if your disease has responded to treatment or it remains largely unchanged after initial chemotherapy.

Pemetrexed Hospira UK Limited is also a treatment for patients with advanced stage of lung cancer whose disease has progressed after other initial chemotherapy has been used.

#### 2. What you need to know before you use Pemetrexed Hospira UK Limited

##### **Do not use Pemetrexed Hospira UK Limited**

- if you are allergic to pemetrexed or any of the other ingredients of this medicine (listed in section 6).
- if you are breast-feeding; you must discontinue breast-feeding during treatment with Pemetrexed Hospira UK Limited.
- if you have recently received or are about to receive a vaccine against yellow fever.

##### **Warnings and precautions**

Talk to your doctor or hospital pharmacist before receiving Pemetrexed Hospira UK Limited.

If you currently have or have previously had problems with your kidneys, talk to your doctor or hospital pharmacist as you may not be able to receive Pemetrexed Hospira UK Limited.

Before each infusion you will have samples of your blood taken to evaluate if you have sufficient kidney and liver function and to check that you have enough blood cells to receive Pemetrexed Hospira UK Limited. Your doctor may decide to change the dose or delay treating you depending on your general condition and if your blood cell counts are too low. If you are also receiving cisplatin, your doctor will make sure that you are properly hydrated and receive appropriate treatment before and after receiving cisplatin to prevent vomiting.

If you have had or are going to have radiation therapy, please tell your doctor, as there may be an early or late radiation reaction with Pemetrexed Hospira UK Limited.

If you have been recently vaccinated, please tell your doctor, as this can possibly cause bad effects with Pemetrexed Hospira UK Limited.

If you have heart disease or a history of heart disease, please tell your doctor.

If you have an accumulation of fluid around your lungs, your doctor may decide to remove the fluid before giving you Pemetrexed Hospira UK Limited.

### **Children and adolescents**

There is no relevant use of pemetrexed in the paediatric population.

### **Other medicines and Pemetrexed Hospira UK Limited**

Please tell your doctor if you are taking any medicine for pain or inflammation (swelling), such as medicines called “nonsteroidal anti-inflammatory drugs” (NSAIDs), including medicines purchased without a doctor’s prescription (such as ibuprofen). There are many sorts of NSAIDs with different durations of activity. Based on the planned date of your infusion of pemetrexed and/or on the status of your kidney function, your doctor needs to advise you on which medicines you can take and when you can take them. If you are unsure, ask your doctor or pharmacist if any of your medicines are NSAIDs.

Please tell your doctor or hospital pharmacist if you are taking or have recently taken any other medicines, including medicines obtained without a prescription.

### **Pregnancy**

If you are pregnant, think you may be pregnant or are planning to have a baby, tell your doctor. The use of pemetrexed should be avoided during pregnancy. Your doctor will discuss with you the potential risk of taking pemetrexed during pregnancy. Women must use effective contraception during treatment with pemetrexed.

### **Breast-feeding**

If you are breast-feeding, tell your doctor. Breast-feeding must be discontinued during pemetrexed treatment.

### **Fertility**

Men are advised not to father a child during and up to 6 months following treatment with pemetrexed and should therefore use effective contraception during treatment with pemetrexed and for up to 6 months afterwards. If you would like to father a child during the treatment or in the 6 months following receipt of treatment, seek advice from your doctor or pharmacist. You may want to seek counselling on sperm storage before starting your therapy.

### **Driving and using machines**

Pemetrexed Hospira UK Limited may make you feel tired. Be careful when driving a car or using machines.



### 3. How to use Pemetrexed Hospira UK Limited

The dose of Pemetrexed Hospira UK Limited is 500 milligrams for every square metre of your body's surface area. Your height and weight are measured to work out the surface area of your body. Your doctor will use this body surface area to work out the right dose for you. This dose may be adjusted, or treatment may be delayed depending on your blood cell counts and on your general condition. A hospital pharmacist, nurse or doctor will have mixed the Pemetrexed Hospira UK Limited powder with water for injections and 5% glucose solution for injection before it is given to you.

You will always receive Pemetrexed Hospira UK Limited by infusion into one of your veins. The infusion will last approximately 10 minutes.

Use in combination with cisplatin

The doctor or hospital pharmacist will work out the dose you need based on your height and weight. Cisplatin is also given by infusion into one of your veins, and is given approximately 30 minutes after the infusion of Pemetrexed Hospira UK Limited has finished. The infusion of cisplatin will last approximately 2 hours.

You should usually receive your infusion once every 3 weeks.

Additional medicines

Corticosteroids: your doctor will prescribe you steroid tablets (equivalent to 4 milligram of dexamethasone twice a day) that you will need to take on the day before, on the day of, and the day after Pemetrexed Hospira UK Limited treatment. This medicine is given to you to reduce the frequency and severity of skin reactions that you may experience during your anticancer treatment.

Vitamin supplementation: your doctor will prescribe you oral folic acid (vitamin) or a multivitamin containing folic acid (350 to 1,000 micrograms) that you must take once a day while you are taking Pemetrexed Hospira UK Limited. You must take at least 5 doses during the seven days before the first dose of Pemetrexed Hospira UK Limited. You must continue taking the folic acid for 21 days after the last dose of Pemetrexed Hospira UK Limited. You will also receive an injection of vitamin B<sub>12</sub> (1,000 micrograms) in the week before administration of Pemetrexed Hospira UK Limited and then approximately every 9 weeks (corresponding to 3 courses of Pemetrexed Hospira UK Limited treatment). Vitamin B<sub>12</sub> and folic acid are given to you to reduce the possible toxic effects of the anticancer treatment.

If you have any further questions on the use of this medicine, ask your doctor or pharmacist.

### 4. Possible side effects

Like all medicines, this medicine can cause side effects, although not everybody gets them.

You must contact your doctor immediately if you notice any of the following:

- Fever or infection (common): if you have a temperature of 38°C or greater, sweating or other signs of infection (since you might have less white blood cells than normal which is very common). Infection (sepsis) may be severe and could lead to death.
- If you start feeling chest pain (common) or having a fast heart rate (uncommon).
- If you have pain, redness, swelling or sores in your mouth (very common).
- Allergic reaction: if you develop skin rash (very common) / burning or prickling sensation (common), or fever (common). Rarely, skin reactions may be severe and could lead to death. Contact your doctor if you get a severe rash, or itching, or blistering (Stevens-Johnson syndrome or toxic epidermal necrolysis).
- If you experience tiredness, feeling faint, becoming easily breathless or if you look pale (since you might have less haemoglobin than normal which is very common).

- If you experience bleeding from the gums, nose or mouth or any bleeding that would not stop, reddish or pinkish urine, unexpected bruising (since you might have less platelets than normal which is very common).
- If you experience sudden breathlessness, intense chest pain or cough with bloody sputum (uncommon) (may indicate a blood clot in the blood vessels of the lungs).

Side effects with pemetrexed may include:

*Very common (may affect more than 1 in 10 people)*

Low white blood cells  
 Low haemoglobin level (anaemia)  
 Low platelet count  
 Diarrhoea  
 Vomiting  
 Pain, redness, swelling or sores in your mouth  
 Nausea  
 Loss of appetite  
 Fatigue (tiredness)  
 Skin rash  
 Hair loss  
 Constipation  
 Loss of sensation  
 Kidney: abnormal blood tests

*Common (may affect up to 1 in 10 people)*

Allergic reaction: skin rash / burning or prickling sensation  
 Infection including sepsis  
 Fever  
 Dehydration  
 Kidney failure  
 Irritation of the skin and itching  
 Chest pain  
 Muscle weakness  
 Conjunctivitis (inflamed eye)  
 Upset stomach  
 Pain in the abdomen  
 Taste change  
 Liver: abnormal blood tests  
 Watery eyes

*Uncommon (may affect up to 1 in 100 people)*

Acute renal failure  
 Fast heart rate  
 Inflammation of the lining of the oesophagus (gullet) has been experienced with pemetrexed / radiation therapy.  
 Colitis (inflammation of the lining of the large bowel, which may be accompanied by intestinal or rectal bleeding)  
 Interstitial pneumonitis (scarring of the air sacs of the lung)  
 Oedema (excess fluid in body tissue, causing swelling). Some patients have experienced a heart attack, stroke or “mini-stroke” while receiving pemetrexed usually in combination with another anticancer therapy.  
 Pancytopenia- combined low counts of white cells, red cells and platelets  
 Radiation pneumonitis (scarring of the air sacs of the lung associated with radiation therapy) may occur in patients who are also treated with radiation either before, during or after their pemetrexed therapy.  
 Extremity pain, low temperature and discolouration have been reported.  
 Blood clots in the lung blood vessels (pulmonary embolism)

*Rare (may affect up to 1 in 1,000 people)*

Radiation recall (a skin rash like severe sunburn) which can occur on skin that has previously been exposed to radiotherapy, from days to years after the radiation.

Bullous conditions (blistering skin diseases)-including Stevens-Johnson syndrome and toxic epidermal necrolysis

Haemolytic anaemia (anaemia due to destruction of red blood cells)

Hepatitis (inflammation of the liver)

Anaphylactic shock (severe allergic reaction)

*Not known: frequency cannot be estimated from the available data*

Lower limb swelling with pain and redness

Increased urine output

Thirst and increased water consumption

Hypernatraemia – increased sodium in blood

### **Reporting of side effects**

If you get any side effects, talk to your doctor. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via the national reporting system listed in [Appendix V](#). By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Pemetrexed Hospira UK Limited**

Keep this medicine out of the sight and reach of children.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

### Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion

Store the 100 mg vial below 30°C.

### Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion

The 500 mg vial does not require any special storage conditions.

### Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion

The 1,000 mg vial does not require any special storage conditions.

Reconstituted and infusion solutions: When prepared as directed, chemical and physical in-use stability has been demonstrated for 24 hours at refrigerated temperature (2°C to 8°C) and at 25°C.

From a microbiological point of view, the product should be used immediately. If not used immediately, in-use storage times and conditions prior to use are the responsibility of the user and would not be longer than 24 hours at 2°C to 8°C.

The reconstituted solution is clear and ranges in colour from colourless to yellow or green-yellow without adversely affecting product quality. Parenteral medicines must be inspected visually for particulate matter and discolouration prior to administration. If particulate matter is observed, do not administer.

This medicine is for single use only; any unused solution must be disposed of in accordance with local requirement.

## 6. Contents of the pack and other information

### What Pemetrexed Hospira UK Limited contains

The active substance is pemetrexed.

Pemetrexed Hospira UK Limited 100 mg powder for concentrate for solution for infusion  
Each vial contains 100 milligrams of pemetrexed (as pemetrexed ditromethamine).

Pemetrexed Hospira UK Limited 500 mg powder for concentrate for solution for infusion  
Each vial contains 500 milligrams of pemetrexed (as pemetrexed ditromethamine).

Pemetrexed Hospira UK Limited 1,000 mg powder for concentrate for solution for infusion  
Each vial contains 1,000 milligrams of pemetrexed (as pemetrexed ditromethamine).

After reconstitution as directed, the solution contains 25 mg/ml of pemetrexed. Further dilution by a healthcare provider is required prior to administration.

The other ingredient is mannitol.

### What Pemetrexed Hospira UK Limited looks like and contents of the pack

Pemetrexed Hospira UK Limited is a powder for concentrate for solution for infusion in a glass vial. It is a white to either light yellow or green-yellow lyophilised powder.

Each pack contains one glass vial of 100 mg, 500 mg or 1,000 mg pemetrexed.

### Marketing Authorisation Holder and Manufacturer

Hospira UK Limited  
Horizon  
Honey Lane  
Hurley  
Maidenhead  
SL6 6RJ  
United Kingdom

For any information about this medicine, please contact the local representative of the Marketing Authorisation Holder:

<b>BE / LU</b> Pfizer SA/NV Tél/Tel: + 32 2 554 62 11	<b>LV</b> Pfizer Luxembourg SARL filiāle Latvijā Tel.: +371 670 35 775
<b>BG / EL / MT / UK</b> Hospira UK Ltd Tel: + 44 (0) 1628 515500	<b>LT</b> Pfizer Luxembourg SARL filialas Lietuvoje Tel. + 370 52 51 4000
<b>CZ</b> Pfizer, spol. s r.o. Tel: +420-283-004-111	<b>HU</b> Pfizer Kft. Tel: + 36 1 488 37 00
<b>DK</b> Pfizer ApS Tlf: + 45 44 20 11 00	<b>NL</b> Pfizer bv Tel: +31 (0)10 406 43 01

<b>DE</b> Pfizer Pharma PFE GmbH Tel: + 49 (0) 800 8535555	<b>NO</b> Pfizer AS Tlf: +47 67 52 61 00
<b>EE</b> Pfizer Luxembourg SARL Eesti filiaal Tel: +372 666 7500	<b>AT</b> Pfizer Corporation Austria Ges.m.b.H. Tel: +43 (0)1 521 15-0
<b>ES</b> Pfizer GEP, S.L. Tel: +34 91 490 99 00	<b>PL</b> Pfizer Polska Sp. z o.o. Tel: +48 22 335 61 00
<b>FR</b> Pfizer PFE France Tél: + 33 (0) 1 58 07 34 40	<b>PT</b> Laboratórios Pfizer, Lda. Tel: + 351 21 423 55 00
<b>HR</b> Pfizer Croatia d.o.o. Tel: +385 1 3908 777	<b>SI</b> Pfizer Luxembourg SARL Pfizer, podružnica za svetovanje s področja farmacevtske dejavnosti, Ljubljana Tel: +386 (0)1 52 11 400
<b>IE</b> Hospira Ireland Sales Limited Tel: 1800 633 363 (toll free) +44 (0) 1304 616161	<b>SK</b> Pfizer Luxembourg SARL, organizačná zložka Tel: +421-2-3355 5500
<b>IS</b> Icepharma hf. Sími: +354 540 8000	<b>FI</b> Pfizer PFE Finland Oy Puh/Tel: +358 (0)9 430 040
<b>IT</b> Pfizer Italia Srl Tel: +39 06 33 18 21	<b>SE</b> Pfizer AB Tel: +46 (0)8 550 520 00
<b>CY</b> Pharmaceutical Trading Co Ltd Τηλ: 24656165	<b>RO</b> Pfizer România S.R.L. Tel: +40 (0)21 207 28 00

**This leaflet was last revised in month YYYY.**

#### **Other sources of information**

Detailed information on this medicine is available on the European Medicines Agency web site:  
<http://www.ema.europa.eu>.

This leaflet is available in all EU/EEA languages on the European Medicines Agency website.

-----

The following information is intended for healthcare professionals only:

### **Instructions for use, handling and disposal**

1. Use aseptic technique during the reconstitution and further dilution of pemetrexed for intravenous infusion administration.
2. Calculate the dose and the number of Pemetrexed Hospira UK Limited vials needed. Each vial contains an excess of pemetrexed to facilitate delivery of label amount.
3. Pemetrexed Hospira UK Limited must only be reconstituted with sterile water for injections.

Pemetrexed Hospira UK Limited 100mg vial:

Reconstitute each 100 mg vial with 4.2 ml of sterile water for injections, resulting in a solution containing 25 mg/ml pemetrexed.

Pemetrexed Hospira UK Limited 500mg vial:

Reconstitute each 500 mg vial with 20 ml of sterile water for injections, resulting in a solution containing 25 mg/ml pemetrexed.

Pemetrexed Hospira UK Limited 1,000mg vial:

Reconstitute each 1,000 mg vial with 40 ml of sterile water for injections, resulting in a solution containing 25 mg/ml pemetrexed.

Gently swirl each vial until the powder is completely dissolved. The resulting solution is clear and ranges in colour from colourless to yellow or green-yellow without adversely affecting product quality. The pH of the reconstituted solution is between 5.7 and 7.7. **Further dilution is required.**

4. Pemetrexed Hospira UK Limited must only be further diluted with 5% glucose solution, without preservative. The appropriate volume of reconstituted pemetrexed solution must be further diluted to 100 ml with 5% glucose solution for injection, without preservative, and administered as an intravenous infusion over 10 minutes.
5. Pemetrexed infusion solutions prepared as directed above are compatible with polyvinyl chloride- and polyolefin- lined administration sets and infusion bags. Pemetrexed is incompatible with diluents containing calcium, including lactated Ringer's Injection and Ringer's Injection
6. Parenteral medicinal products must be inspected visually for particulate matter and discolouration prior to administration. If particulate matter is observed, do not administer.
7. Pemetrexed solutions are for single use only.

Any unused medicinal product or waste material must be disposed of in accordance with local requirements.

***Preparation and administration precautions:*** As with other potentially toxic anti-cancer agents, care should be exercised in the handling and preparation of pemetrexed infusion solutions. The use of gloves is recommended. If a pemetrexed solution contacts the skin, wash the skin immediately and thoroughly with soap and water. If pemetrexed solutions contact the mucous membranes, flush thoroughly with water. Pemetrexed is not a vesicant. There is not a specific antidote for extravasation of pemetrexed. There have been few reported cases of pemetrexed extravasation, which were not assessed as serious by the investigator. Extravasation should be managed by local standard practice as with other non-vesicants.