SUMMARY OF PRODUCT CHARACTERISTICS

1 NAME OF THE MEDICINAL PRODUCT

Dacogen 50 mg powder for concentrate for solution for infusion.

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each vial of powder for concentrate for solution for infusion contains 50 mg decitabine.

After reconstitution with 10 ml of water for injections, each ml of concentrate contains 5 mg of decitabine.

Excipients with known effect

Each vial contains 0.29 mmol sodium (E524).

For the full list of excipients, see section 6.1.

3 PHARMACEUTICAL FORM

Powder for concentrate for solution for infusion (powder for infusion).

White to almost white lyophilized powder.

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

Dacogen is indicated for the treatment of adult patients with newly diagnosed *de novo* or secondary acute myeloid leukaemia (AML), according to the World Health Organisation (WHO) classification, who are not candidates for standard induction chemotherapy.

4.2 Posology and method of administration

Dacogen administration must be initiated under the supervision of physicians experienced in the use of chemotherapeutic medicinal products.

Posology

In a treatment cycle, Dacogen is administered at a dose of 20 mg/m^2 body surface area by intravenous infusion over 1 hour repeated daily for 5 consecutive days (i.e., a total of 5 doses per treatment cycle). The total daily dose must not exceed 20 mg/m^2 and the total dose per treatment cycle must not exceed 100 mg/m^2. If a dose is missed, treatment should be resumed as soon as possible. The cycle should be repeated every 4 weeks depending on the patient's clinical response and observed toxicity. It is recommended that patients be treated for a minimum of 4 cycles; however, a complete or partial remission may take longer than 4 cycles to be obtained. Treatment may be continued as long as the patient shows response, continues to benefit or exhibits stable disease, i.e., in the absence of overt progression.

If after 4 cycles, the patient's haematological values (e.g., platelet counts or absolute neutrophil count), have not returned to pre-treatment levels or if disease progression occurs (peripheral blast counts are increasing or bone marrow blast counts are worsening), the patient may be considered to be a non-responder and alternative therapeutic options to Dacogen should be considered.

Pre-medication for the prevention of nausea and vomiting is not routinely recommended but may be administered if required.

Management of myelosuppression and associated complications

Myelosuppression and adverse events related to myelosuppression (thrombocytopaenia, anaemia, neutropaenia, and febrile neutropaenia) are common in both treated and untreated patients with AML. Complications of myelosuppression include infections and bleeding. Treatment may be delayed at the discretion of the treating physician, if the patient experiences myelosuppression-associated complications, such as those described below:

- Febrile neutropaenia (temperature ≥ 38.5°C and absolute neutrophil count < 1,000/µL)
- Active viral, bacterial or fungal infection (i.e., requiring intravenous anti-infectives or extensive supportive care)
- Haemorrhage (gastrointestinal, genito-urinary, pulmonary with platelets < 25,000/µL or any central nervous system haemorrhage)

Treatment with Dacogen may be resumed once these conditions have improved or have been stabilised with adequate treatment (anti-infective therapy, transfusions, or growth factors).

In clinical studies, approximately one-third of patients receiving Dacogen required a dose-delay. Dose reduction is not recommended.

Paediatric population

Dacogen should not be used in children with AML aged < 18 years, because efficacy was not established. Currently available data are described in sections 4.8, 5.1, and 5.2.

Hepatic impairment

Studies in patients with hepatic impairment have not been conducted. The need for dose adjustment in patients with hepatic impairment has not been evaluated. If

worsening hepatic function occurs, patients should be carefully monitored (see sections 4.4 and 5.2).

Renal impairment

Studies in patients with renal impairment have not been conducted. The need for dose adjustment in patients with renal impairment has not been evaluated (see section 4.4 and 5.2).

Method of administration

Dacogen is administered by intravenous infusion. A central venous catheter is not required.

For instructions on reconstitution and dilution of the medicinal product before administration, see section 6.6.

4.3 Contraindications

Hypersensitivity to decitabine or to any of the excipients, listed in section 6.1.

Breast-feeding (see section 4.6)

4.4 Special warnings and precautions for use

Myelosuppression

Myelosuppression and complications of myelosuppression, including infections and bleeding that occur in patients with AML may be exacerbated with Dacogen treatment. Therefore, patients are at increased risk for severe infections (due to any pathogen such as bacterial, fungal and viral), with potentially fatal outcome (see section 4.8). Patients should be monitored for signs and symptoms of infection and treated promptly.

In clinical studies, the majority of patients had baseline Grade 3/4 myelosuppression. In patients with baseline Grade 2 abnormalities, worsening of myelosuppression was seen in most patients and more frequently than in patients with baseline Grade 1 or 0 abnormalities. Myelosuppression caused by Dacogen is reversible. Complete blood and platelet counts should be performed regularly, as clinically indicated and prior to each treatment cycle. In the presence of myelosuppression or its complications, treatment with Dacogen may be interrupted and/or supportive measures instituted (see sections 4.2 and 4.8).

Respiratory, thoracic and mediastinal disorders

Cases of interstitial lung disease (ILD) (including pulmonary infiltrates, organising pneumonia and pulmonary fibrosis) without signs of infectious aetiology have been reported in patients receiving decitabine. Careful assessment of patients with an acute onset or unexplained worsening of pulmonary symptoms should be performed to exclude ILD. If ILD is confirmed, appropriate treatment should be initiated (see section 4.8).

Hepatic impairment

Use in patients with hepatic impairment has not been established. Caution should be exercised in the administration of Dacogen to patients with hepatic impairment and in patients who develop signs or symptoms of hepatic impairment. Liver function tests should be performed prior to initiation of therapy and prior to each treatment cycle, and as clinically indicated (see sections 4.2 and 5.2).

Renal impairment

Use in patients with severe renal impairment has not been studied. Caution should be exercised in the administration of Dacogen to patients with severe renal impairment (Creatinine Clearance [CrCl] < 30 ml/min). Renal function tests should be performed prior to initiation of therapy and prior to each treatment cycle, and as clinically indicated (see section 4.2).

Cardiac disease

Patients with a history of severe congestive heart failure or clinically unstable cardiac disease were excluded from clinical studies and therefore, the safety and efficacy of Dacogen in these patients has not been established. Cases of cardiomyopathy with cardiac decompensation, in some cases reversible after treatment discontinuation, dose reduction or corrective treatment, have been reported in the postmarketing setting. Patients, especially those with cardiac disease history, should be monitored for signs and symptoms of heart failure.

Differentiation syndrome

Cases of differentiation syndrome (also known as retinoic acid syndrome) have been reported in patients receiving decitabine. Differentiation syndrome may be fatal (see section 4.8). Treatment with high-dose IV corticosteroids and haemodynamic monitoring should be considered at first onset of symptoms or signs suggestive of differentiation syndrome. Temporary discontinuation of Dacogen should be considered until resolution of symptoms and if resumed, caution is advised.

Excipients

This medicine contains 0.5 mmol potassium per vial. After reconstitution and dilution of the solution for intravenous infusion, this medicine contains less than 1 mmol (39 mg) of potassium per dose, i.e. essentially ‘potassium- free’.

This medicine contains 0.29 mmol (6.67 mg) sodium per vial. After reconstitution and dilution of the solution for intravenous infusion, this medicine contains between 13.8 mg-138 mg (0.6-6 mmol) sodium per dose (depending on the infusion fluid for dilution), equivalent to 0.7-7% of the WHO recommended maximum daily intake of 2 g sodium for an adult.

4.5 Interaction with other medicinal products and other forms of interaction

No formal clinical drug interaction studies with decitabine have been conducted.

There is the potential for a drug-drug interaction with other agents which are also activated by sequential phosphorylation (via intracellular phosphokinase activities) and/or metabolised by enzymes implicated in the inactivation of decitabine (e.g., cytidine deaminase). Therefore, caution should be exercised if these active substances are combined with decitabine.

Impact of co-administered medicinal products on decitabine

Cytochrome (CYP) 450-mediated metabolic interactions are not anticipated as decitabine metabolism is not mediated by this system but by oxidative deamination.

Impact of decitabine on co-administered medicinal products

Given its low *in vitro* plasma protein binding (< 1%), decitabine is unlikely to displace co-administered medicinal products from their plasma protein binding. Decitabine has been shown to be a weak inhibitor of P-gp mediated transport *in vitro* and is therefore, also not expected to affect P-gp mediated transport of co-administered medicinal products (see section 5.2).

4.6 Fertility, pregnancy and lactation

Women of childbearing potential/Contraception in men and women

Due to the genotoxic potential of decitabine (see section 5.3), women of childbearing potential must use effective contraceptive measures and avoid becoming pregnant while being treated with Dacogen and for 6 months following completion of treatment. Men should use effective contraceptive measures and be advised to not father a child while receiving Dacogen, and for 3 months following completion of treatment (see section 5.3).

The use of decitabine with hormonal contraceptives has not been studied.

Pregnancy

There are no adequate data on the use of Dacogen in pregnant women. Studies have shown that decitabine is teratogenic in rats and mice (see section 5.3). The potential risk for humans is unknown. Based on results from animal studies and its mechanism of action, Dacogen should not be used during pregnancy and in women of childbearing potential not using effective contraception. A pregnancy test should be performed on all women of childbearing potential before treatment is started. If Dacogen is used during pregnancy, or if a patient becomes pregnant while receiving this medicinal product, the patient should be apprised of the potential hazard to the foetus.

Breast-feeding

It is not known whether decitabine or its metabolites are excreted in breast milk. Dacogen is contraindicated during breast-feeding; therefore, if treatment with this medicine is required, breast-feeding must be discontinued (see section 4.3).

Fertility

No human data on the effect of decitabine on fertility are available. In non-clinical animal studies, decitabine alters male fertility and is mutagenic. Because of the possibility of infertility as a consequence of Dacogen therapy, men should seek advice on conservation of sperm and female patients of childbearing potential should seek consultation regarding oocyte cryopreservation prior to initiation of treatment.

4.7 Effects on ability to drive and use machines

Dacogen has moderate influence on the ability to drive and use machines. Patients should be advised that they may experience undesirable effects such as anaemia during treatment. Therefore, caution should be recommended when driving a car or operating machines.

4.8 Undesirable effects

Summary of the safety profile

The most common adverse drug reactions (≥ 35%) reported are pyrexia, anaemia and thrombocytopaenia.

The most common Grade 3/4 adverse drug reactions (≥ 20%) included pneumonia, thrombocytopaenia, neutropaenia, febrile neutropaenia and anaemia.

In clinical studies, 30% of patients treated with Dacogen and 25% of patients treated in the comparator arm had adverse events with an outcome of death during treatment or within 30 days after the last dose of study drug.

In the Dacogen treatment group, there was a higher incidence of treatment discontinuation due to adverse events in women compared to men (43% versus 32%).

Tabulated list of adverse drug reactions

Adverse drug reactions reported in 293 AML patients treated with Dacogen are summarised in Table 1. The following table reflects data from AML clinical studies and from post-marketing experience. The adverse drug reactions are listed by frequency category. Frequency categories are defined as follows: Very common (≥ 1/10), common (≥ 1/100 to < 1/10), uncommon (≥ 1/1,000 to < 1/100), rare (≥ 1/10,000 to < 1/1,000), very rare (< 1/10,000), not known (frequency cannot be estimated from the available data).

Within each frequency grouping, adverse drug reactions are presented in order of decreasing seriousness.

Table 1: Adverse drug reactions identified with Dacogen

System Organ Class	Frequency (all Grades)	Adverse Drug Reaction	Frequency	
			All Grades[a] (%)	Grades 3-4[a] (%)
Infections and infestations	Very common	pneumonia*	24	20
		urinary tract infection*	15	7
		All other infections (viral, bacterial, fungal)*[, b, c, d]	63	39
	Common	septic shock*	6	4
		sepsis*	9	8
		sinusitis	3	1

Neoplasms benign, malignant and unspecified (incl. cysts and polyps)	Not known	differentiation syndrome	Not known	Not known
Blood and lymphatic disorders	Very common	febrile neutropaenia*	34	32
		neutropaenia*	32	30
		thrombocytopaenia*,[e]	41	38
		anaemia	38	31
		leukopaenia	20	18
	Uncommon	pancytopaenia*	< 1	< 1
Immune system disorders	Common	hypersensitivity including anaphylactic reaction[f]	1	< 1
Metabolism and nutrition disorders	Very common	hyperglycaemia	13	3
Nervous system disorders	Very common	headache	16	1
Cardiac disorders	Uncommon	cardiomyopathy	< 1	< 1
Respiratory, thoracic and mediastinal disorders	Very common	epistaxis	14	2
	Not known	interstitial lung disease	Not known	Not known
Gastrointestinal disorders	Very common	diarrhoea	31	2
		vomiting	18	1
		nausea	33	< 1
	Common	stomatitis	7	1
	Not known	enterocolitis, including neutropaenic colitis, caecitis*	Not known	Not known
Hepatobiliary disorders	Very common	hepatic function abnormal	11	3
	Common	hyperbilirubinaemia[g]	5	<1
Skin and subcutaneous tissue disorders	Uncommon	acute febrile neutrophilic dermatosis (Sweet's syndrome)	< 1	NA
General disorders and administration site conditions	Very common	pyrexia	48	9

[a] Worst National Cancer Institute Common Terminology Criteria for Adverse Events Grade.
[b] Excluding pneumonia, urinary tract infection, sepsis, septic shock and sinusitis.
[c] The most frequently reported "other infections" in study DACO-016 were: oral herpes, oral candidiasis, pharyngitis, upper respiratory tract infection, cellulitis, bronchitis, nasopharyngitis.
[d] Including enterocolitis infectious.
[e] Including haemorrhage associated with thrombocytopaenia, including fatal cases.
[f] Including preferred terms hypersensitivity, drug hypersensitivity, anaphylactic reaction, anaphylactic shock, anaphylactoid reaction, anaphylactoid shock.
[g] In clinical studies in AML and myelodysplastic syndrome (MDS), the reporting frequency for hyperbilirubinaemia was 11% for All Grades and 2% for Grade 3-4.
* Includes events with a fatal outcome.
NA = Not applicable

Description of selected adverse drug reactions

Haematologic adverse drug reactions

The most commonly reported haematologic adverse drug reactions associated with Dacogen treatment included febrile neutropaenia, thrombocytopaenia, neutropaenia, anaemia and leukopaenia.

Serious bleeding-related adverse drug reactions, some of which lead to a fatal outcome, such as central nervous system (CNS) haemorrhage (2%) and gastrointestinal (GI) haemorrhage (2%), in the context of severe thrombocytopaenia, were reported in patients receiving decitabine.

Haematological adverse drug reactions should be managed by routine monitoring of complete blood counts and early administration of supportive treatments as required. Supportive treatments include, administration of prophylactic antibiotics and/or growth factor support (e.g., G-CSF) for neutropaenia and transfusions for anaemia or thrombocytopaenia according to institutional guidelines. For situations where decitabine administration should be delayed, see section 4.2.

Infections and infestations adverse drug reactions

Serious infection-related adverse drug reactions, with potentially fatal outcome, such as septic shock, sepsis, pneumonia, and other infections (viral, bacterial and fungal) were reported in patients receiving decitabine.

Gastrointestinal disorders

Occurrences of enterocolitis, including neutropaenic colitis, caecitis have been reported during treatment with decitabine. Enterocolitis may lead to septic complications and may be associated with fatal outcome.

Respiratory, thoracic and mediastinal disorders

Cases of interstitial lung disease (including pulmonary infiltrates, organising pneumonia and pulmonary fibrosis) without signs of infectious aetiology have been reported in patients receiving decitabine.

Differentiation syndrome

Cases of differentiation syndrome (also known as retinoic acid syndrome) have been reported in patients receiving decitabine. Differentiation syndrome may be fatal and symptoms and clinical findings include respiratory distress, pulmonary infiltrates, fever, rash, pulmonary oedema, peripheral oedema, rapid weight gain, pleural effusions, pericardial effusions, hypotension and renal dysfunction. Differentiation syndrome may occur with or without concomitant leucocytosis. Capillary leak syndrome and coagulopathy can also occur (see section 4.4).*Paediatric population*

The safety assessment in paediatric patients is based on the limited safety data from a Phase I/II study to evaluate pharmacokinetics, safety and efficacy of Dacogen in

paediatric patients (aged 1 to 14 years) with relapsed or refractory AML (n = 17) (see section 5.1). No new safety signal was observed in this paediatric study.

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 Yellow Card Scheme Website: www.mhra.gov.uk/yellowcard or search for MHRA Yellow Card in the Google Play or Apple App Store.

4.9 Overdose

There is no direct experience of human overdose and no specific antidote. However, early clinical study data in published literature at doses greater than 20 times higher than the current therapeutic dose, reported increased myelosuppression including prolonged neutropaenia and thrombocytopaenia. Toxicity is likely to manifest as exacerbations of adverse drug reactions, primarily myelosuppression. Treatment for overdose should be supportive.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Antineoplastic agents, antimetabolites, pyrimidine analogues; ATC Code: L01BC08

Mechanism of action

Decitabine (5-aza-2′-deoxycytidine) is a cytidine deoxynucleoside analogue that selectively inhibits DNA methyltransferases at low doses, resulting in gene promoter hypomethylation that can result in reactivation of tumour suppressor genes, induction of cellular differentiation or cellular senescence followed by programmed cell death.

Clinical experience

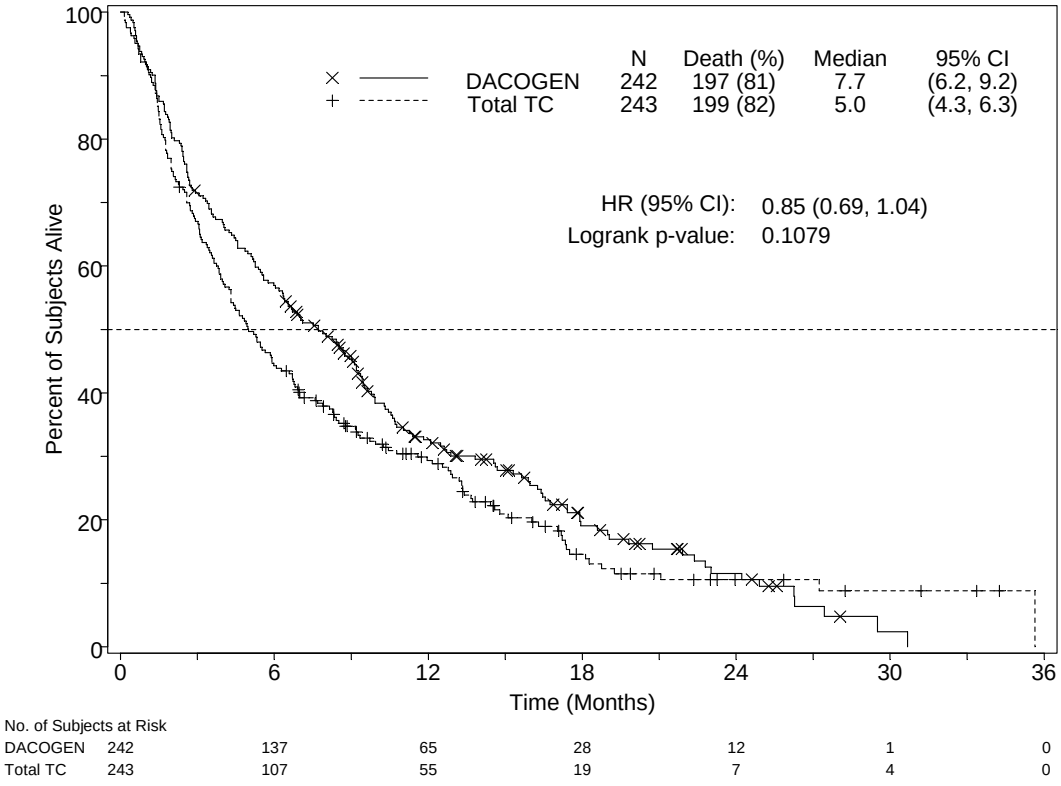
The use of Dacogen was studied in an open-label, randomised, multicentre Phase III study (DACO-016) in subjects with newly diagnosed *de novo* or secondary AML according to the WHO classification. Dacogen (n = 242) was compared to treatment choice (TC, n = 243) which consisted of patient's choice with physician's advice of either supportive care alone (n = 28, 11.5%) or 20 mg/m^2 cytarabine subcutaneously once daily for 10 consecutive days repeated every 4 weeks (n = 215, 88.5%). Dacogen was administered as a 1-hour intravenous infusion of 20 mg/m^2 once daily for 5 consecutive days repeated every 4 weeks.

Subjects who were considered candidates for standard induction chemotherapy were not included in the study as shown by the following baseline characteristics. The median age for the intent-to-treat (ITT) population was 73 years (range 64 to 91 years). Thirty-six percent of subjects had poor-risk cytogenetics at baseline. The remainder of the subjects had intermediate-risk cytogenetics. Patients with favourable cytogenetics were not included in the study. Twenty-five percent of subjects had an ECOG performance status ≥ 2. Eighty-one percent of subjects had significant comorbidities (e.g., infection, cardiac impairment, pulmonary impairment). The number of patients treated with Dacogen by racial group was White 209 (86.4%) and Asian 33 (13.6%).

The primary endpoint of the study was overall survival. The secondary endpoint was complete remission rate that was assessed by independent expert review. Progression-free survival and Event-free survival were tertiary endpoints.

The median overall survival in the --ITT population was 7.7 months in subjects treated with Dacogen compared to 5.0 months for subjects in the TC arm (hazard ratio 0.85; 95% CI: 0.69, 1.04, p = 0.1079). The difference did not reach statistical significance, however, there was a trend for improvement in survival with a 15% reduction in the risk of death for subjects in the Dacogen arm (Figure 1). When censored for potentially disease modifying subsequent therapy (i.e., induction chemotherapy or hypomethylating agent) the analysis for overall survival showed a 20% reduction in the risk of death for subjects in the Dacogen arm [HR = 0.80, (95% CI: 0.64, 0.99), p-value = 0.0437)].

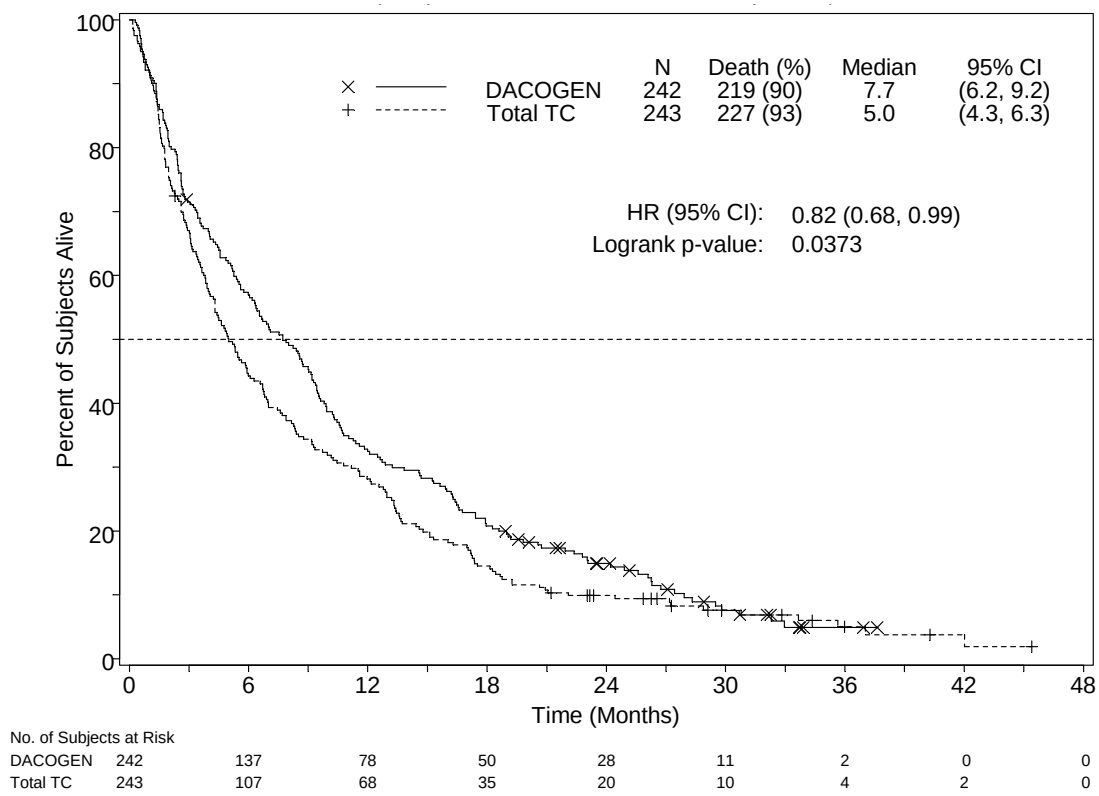
Figure 1. Overall survival (ITT population).



In an analysis with an additional 1 year of mature survival data, the effect of Dacogen on overall survival demonstrated a clinical improvement compared to the TC arm

(7.7 months vs. 5.0 months, respectively, hazard ratio = 0.82, 95% CI: 0.68, 0.99, nominal p-value = 0.0373, Figure 2).

Figure 2. Analysis of mature overall survival data (ITT population).



Based on the initial analysis in the ITT population, a statistically significant difference in complete remission rate (CR + CRp) was achieved in favour of subjects in the Dacogen arm, 17.8% (43/242) compared to the TC arm, 7.8% (19/243); treatment difference 9.9% (95% CI: 4.07; 15.83), p = 0.0011. The median time to best response and median duration of best response in patients who achieved a CR or CRp were 4.3 months and 8.3 months, respectively. Progression-free survival was significantly longer for subjects in the Dacogen arm, 3.7 months (95% CI: 2.7, 4.6) compared with subjects in the TC arm, 2.1 months (95% CI: 1.9, 3.1); hazard ratio 0.75 (95% CI: 0.62, 0.91), p = 0.0031. These results as well as other endpoints are shown in Table 2.

Table 2: Other efficacy endpoints for Study DACO-016 (ITT population)

Outcomes	**Dacogen n = 242**	**TC (combined group) n = 243**	**p-value**
CR + CRp	43 (17.8%)	19 (7.8%)	0.0011
	OR = 2.5 (1.40, 4.78)[b]		
CR	38 (15.7%)	18 (7.4%)	-
EFS[a]	3.5 (2.5, 4.1)[b]	2.1 (1.9, 2.8)[b]	0.0025
	HR = 0.75 (0.62, 0.90)[b]		

PFS[a]	3.7 (2.7, 4.6)[b]	2.1 (1.9, 3.1)[b]	0.0031
	HR = 0.75 (0.62, 0.91)[b]		

CR = complete remission; CRp = complete remission with incomplete platelet recovery,
EFS = event-free survival, PFS = progression-free survival, OR = odds ratio, HR = hazard ratio
- = Not evaluable
[a] Reported as median months
[b] 95% confidence intervals

Overall survival and complete remission rates in pre-specified disease-related sub-groups (i.e., cytogenetic risk, Eastern Cooperative Oncology Group [ECOG] score, age, type of AML, and baseline bone marrow blast count) were consistent with results for the overall study population.

The use of Dacogen as initial therapy was also evaluated in an open-label, single-arm, Phase II study (DACO-017) in 55 subjects > 60 years with AML according to the WHO classification. The primary endpoint was complete remission (CR) rate that was assessed by independent expert review. The secondary endpoint of the study was overall survival. Dacogen was administered as a 1-hour intravenous infusion of 20 mg/m^2 once daily for 5 consecutive days repeated every 4 weeks. In the ITT analysis, a CR rate of 23.6% (95% CI: 13.2, 37) was observed in 13/55 subjects treated with Dacogen. The median time to CR was 4.1 months, and the median duration of CR was 18.2 months. The median overall survival in the ITT population was 7.6 months (95% CI: 5.7, 11.5).

The efficacy and safety of Dacogen has not been evaluated in patients with acute promyelocytic leukaemia or CNS leukaemia.

Paediatric population

A Phase I/II open-label, multicentre study evaluated the safety and efficacy of Dacogen in sequential administration with cytarabine in children aged 1 month to < 18 years with relapsed or refractory AML. A total of 17 subjects were enrolled and received Dacogen 20 mg/m^2 in this study, of which 9 subjects received cytarabine 1 g/m^2 and 8 subjects received cytarabine administered at the maximum tolerable dose of 2 g/m^2. All subjects discontinued the study treatment. The reasons for treatment discontinuation included disease progression (12 [70.6%] subjects), subjects proceeding to transplant (3 [17.6%]), investigator decision (1 [5.9%]), and "other" (1 [5.9%]). Reported adverse events were consistent with the known safety profile of Dacogen in adults (see section 4.8). Based on these negative results, Dacogen should not be used in children with AML aged < 18 years, because efficacy was not established (see section 4.2).

5.2 Pharmacokinetic properties

The population pharmacokinetic (PK) parameters of decitabine were pooled from 3 clinical studies in 45 patients with AML or myelodysplastic syndrome (MDS) utilizing the 5-Day regimen. In each study, decitabine PK was evaluated on the fifth day of the first treatment cycle.

Distribution

The pharmacokinetics of decitabine following intravenous administration as a 1-hour infusion were described by a linear two-compartment model, characterised by rapid elimination from the central compartment and by relatively slow distribution from the peripheral compartment. For a typical patient (weight 70 kg/body surface area 1.73 m^2) the decitabine pharmacokinetic parameters are listed in the Table 3 below.

Table 3: Summary of population PK analysis for a typical patient receiving daily 1-hour infusions of Dacogen 20 mg/m^2 over 5 days every 4 weeks

Parameter [a]	**Predicted Value**	**95% CI**
C_{max} (ng/ml)	107	88.5 - 129
AUC_{cum} (ng.h/ml)	580	480 - 695
$t_{1/2}$ (min)	68.2	54.2 - 79.6
Vd_{ss} (L)	116	84.1 - 153
CL (L/h)	298	249 - 359

[a] The total dose per cycle was 100 mg/m^2

Decitabine exhibits linear PK and following the intravenous infusion, steady-state concentrations are reached within 0.5 hour. Based on model simulation, PK parameters were independent of time (i.e., did not change from cycle to cycle) and no accumulation was observed with this dosing regimen. Plasma protein binding of decitabine is negligible (< 1%). Decitabine Vd_{ss} in cancer patients is large indicating distribution into peripheral tissues. There was no evidence of dependencies on age, creatinine clearance, total bilirubin, or disease.

Biotransformation

Intracellularly, decitabine is activated through sequential phosphorylation via phosphokinase activities to the corresponding triphosphate, which is then incorporated by the DNA polymerase. *In vitro* metabolism data and the human mass balance study results indicated that the cytochrome P450 system is not involved in the metabolism of decitabine. The primary route of metabolism is likely through deamination by cytidine deaminase in the liver, kidney, intestinal epithelium and blood. Results from the human mass-balance study showed that unchanged decitabine in plasma accounted for approximately 2.4% of total radioactivity in plasma. The major circulating metabolites are not believed to be pharmacologically active. The presence of these metabolites in urine together with the high total body clearance and low urinary excretion of unchanged decitabine in the urine (~4% of the dose) indicate that decitabine is appreciably metabolised *in vivo*. *In vitro* studies show that decitabine does not inhibit nor induce CYP 450 enzymes up to more than 20-fold of the therapeutic maximum observed plasma concentration (C_{max}). Thus; CYP-mediated metabolic drug interactions are not anticipated, and decitabine is unlikely to interact with agents metabolised through these pathways. In addition, *in vitro* data show that decitabine is a poor P-gp substrate.

Elimination

Mean plasma clearance following intravenous administration in cancer subjects was > 200 L/h with moderate inter-subject variability (coefficient of variation [CV] is approximately 50%). Excretion of unchanged drug appears to play only a minor role in the elimination of decitabine.

Results from a mass balance study with radioactive ^{14}C-decitabine in cancer patients showed that 90% of the administered dose of decitabine (4% unchanged drug) is excreted in the urine.

Additional information on special populations

The effects of renal or hepatic impairment, gender, age or race on the pharmacokinetics of decitabine have not been formally studied. Information on special populations was derived from pharmacokinetic data from the 3 studies noted above, and from one Phase I study in MDS subjects, (N = 14;
15 mg/m^2 x 3-hours q8h x 3 days).

Elderly

Population pharmacokinetic analysis showed that decitabine pharmacokinetics are not dependent on age (range studied 40 to 87 years; median 70 years).

Paediatric population

Population PK analysis of decitabine showed that after accounting for body size, there is no difference between decitabine PK parameters in paediatric AML patients versus adults with AML or MDS.

Gender

Population pharmacokinetic analysis of decitabine did not show any clinically relevant difference between men and women.

Race

Most of the patients studied were Caucasian. However, the population pharmacokinetic analysis of decitabine indicated that race had no apparent effect on the exposure to decitabine.

Hepatic impairment

The PK of decitabine have not been formally studied in patients with hepatic impairment. Results from a human mass-balance study and *in vitro* experiments mentioned above indicated that the CYP enzymes are unlikely to be involved in the metabolism of decitabine. In addition, the limited data from the population PK analysis indicated no significant PK parameter dependencies on total bilirubin concentration despite a wide range of total bilirubin levels. Thus, decitabine exposure is not likely to be affected in patients with impaired hepatic function.

Renal impairment

The PK of decitabine have not been formally studied in patients with renal insufficiency. The population PK analysis on the limited decitabine data indicated no significant PK parameter dependencies on normalised creatinine clearance, an indicator of renal function. Thus, decitabine exposure is not likely to be affected in patients with impaired renal function.

5.3 Preclinical safety data

Formal carcinogenicity studies have not been performed with decitabine. Evidence from the literature indicates that decitabine has carcinogenic potential. The available data from *in vitro* and *in vivo* studies provide sufficient evidence that decitabine has genotoxic potential. Data from the literature also indicate that decitabine has adverse effects on all aspects of the reproductive cycle, including fertility, embryo-foetal development and post-natal development. Multi-cycle repeat-dose toxicity studies in rats and rabbits indicated that the primary toxicity was myelosuppression, including effects on bone marrow, which was reversible on cessation of treatment.

Gastrointestinal toxicity was also observed and in males, testicular atrophy which did not reverse over the scheduled recovery periods. Decitabine administration to neonatal/juvenile rats showed a comparable general toxicity profile as in older rats. Neurobehavioural development and reproductive capacity were unaffected when neonatal/juvenile rats were treated at dose levels inducing myelosuppression. See section 4.2 for information on paediatric use.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Potassium dihydrogen phosphate (E340)

Sodium hydroxide (E524)

Hydrochloric acid (for pH adjustment)

6.2 Incompatibilities

This medicinal product must not be mixed with other medicinal products except those mentioned in section 6.6.

6.3 Shelf life

Unopened vial

3 years.

Reconstituted and diluted solution

Within 15 minutes of reconstitution, the concentrate (in 10 ml of sterile water for injections) must be further diluted with cold (2°C - 8°C) infusion fluids. This prepared diluted solution for intravenous infusion can be stored at 2°C - 8°C for up to a maximum of 3 hours, followed by up to 1 hour at room temperature (20°C - 25°C) before administration.

From a microbiological point of view, the product should be used within the time period recommended above. It is the responsibility of the user to follow the recommended storage times and conditions and ensure that reconstitution has taken place in aseptic conditions.

6.4 Special precautions for storage

Do not store above 25°C.

For storage conditions of the reconstituted and diluted medicinal product, see section 6.3.

6.5 Nature and contents of container

20 ml clear colourless Type I glass vial sealed with a butyl rubber stopper and an aluminium seal with plastic flip-off cap containing 50 mg decitabine.

Pack size: 1 vial.

6.6 Special precautions for disposal

Recommendations for safe handling

Skin contact with the solution should be avoided and protective gloves must be worn. Standard procedures for dealing with cytotoxic medicinal products should be adopted.

Reconstitution procedure

The powder should be aseptically reconstituted with 10 ml of water for injections. Upon reconstitution, each ml contains approximately 5 mg of decitabine at pH 6.7 to 7.3. Within 15 minutes of reconstitution, the solution must be further diluted with cold infusion fluids (sodium chloride 9 mg/ml [0.9%] solution for injection or 5% glucose solution for injection) to a final concentration of 0.15 to 1.0 mg/ml. For the shelf-life and the precaution for storage after reconstitution, see section 6.3.

Dacogen should not be infused through the same intravenous access/line with other medicinal products.

Disposal

This medicinal product is for single use only. Any unused medicinal product or waste material should be disposed of in accordance with local requirements.

7 MARKETING AUTHORISATION HOLDER

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