

Gemcitabine (1000mg/m²) and Capecitabine (830mg/m²) Therapy - 28 day

INDICATIONS FOR USE:

INDICATION	ICD10	Regimen Code	HSE approved reimbursement status*
Adjuvant treatment of pancreatic adenocarcinoma after macroscopic complete resection	C25	00524a	Gemcitabine – N/A Capecitabine – CDS

*This applies to post 2012 indications only

TREATMENT:

The starting dose of the drugs detailed below may be adjusted downward by the prescribing clinician, using their independent medical judgement, to consider each patients individual clinical circumstances.

Gemcitabine is administered on day 1, 8 and 15 and capecitabine is taken on day 1-21 of a 28 day cycle for up to 6 cycles or until disease progression or unacceptable toxicity develops.

Facilities to treat anaphylaxis MUST be present when systemic anti-cancer therapy (SACT) is administered.

Day	Drug	Dose	Route	Diluent & Rate	Cycle
1,8,15	Gemcitabine	1000mg/m ²	IV infusion	250mL NaCl 0.9% over 30 minutes	Every 28 days
1 -21	Capecitabine	830mg/m ² Twice Daily ^{a, b, c}	PO	N/A	Every 28 days

^aThe dose to be administered should consider the available tablet strengths.
Reference the NCCP DOSE BANDING TABLES [Available on the NCCP website](#) for guidance on dosing of capecitabine.
Tablets should be swallowed whole with plenty of water with food or within 30 minutes of eating. Tablets should not be crushed or cut.
^b(Total daily dose = 1660mg/m²)
^c See dose modifications section for patients with identified partial dihydropyrimidine dehydrogenase (DPD) deficiency.

ELIGIBILITY:

- Indications as above
- ECOG 0-2

EXCLUSIONS:

- Hypersensitivity to gemcitabine, capecitabine or any of the excipients
- Known complete DPD deficiency
- History of severe and unexpected reactions to fluoropyrimidine therapy
- Pregnancy and lactation
- Severe hepatic or renal impairment

PRESCRIPTIVE AUTHORITY:

The treatment plan must be initiated by a Consultant Medical Oncologist.

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TESTS:

Baseline tests:

- FBC, renal and liver profile
- DPD testing prior to first treatment with capecitabine using phenotype and/or genotype testing unless patient has been previously tested
 - In patients with moderate or severe renal impairment, blood uracil levels used for dihydropyrimidine dehydrogenase (DPD) phenotyping should be interpreted with caution, as impaired kidney function can lead to increased uracil blood levels. Consequently, there is an increased risk for incorrect diagnosis of DPD deficiency, which may result in under dosing of 5-Fluorouracil or other fluoropyrimidines, leading to reduced treatment efficacy. Genotype testing for DPD deficiency should be considered for patients with renal impairment.

Regular tests:

- Day 1: FBC, renal and liver profile
- Day 8 and Day 15: FBC

Disease monitoring:

Disease monitoring should be in line with the patient’s treatment plan and any other test/s as directed by the supervising Consultant.

DOSE MODIFICATIONS:

- Consider a reduced starting dose in patients with identified partial DPD deficiency.
 - Initial dose reduction may impact the efficacy of treatment. In the absence of serious toxicity, subsequent doses may be increased with careful monitoring.
- Any dose modification should be discussed with a Consultant.

Haematological:

Prior to commencing a new treatment cycle (i.e. day 1), ANC must be $\geq 1 \times 10^9/L$ and platelets $\geq 100 \times 10^9/L$.

Table 1: Dose modifications for gemcitabine and capecitabine within a cycle

ANC ($\times 10^9 /L$)		Platelet count ($\times 10^9 /L$)		Other toxicity	Recommended dose of Gemcitabine	Recommended dose of Capecitabine
≥ 1	and	≥ 100			100 %	100%
0.5- 1	or	50-100			75%	100%
< 0.5	or	<50			Omit. Do not restart treatment until ANC ≥ 0.5 and platelets ≥ 50	Interrupt treatment until recovery of toxicity to \leq Grade 1
ANC < 0.5 for ≥ 5 days or ANC < 0.1 for ≥ 3 days or Any incidence of febrile neutropenia	or	< 25	or	cycle delay of >1 week due to any toxicity	Reduce dose to 75% of the original cycle initiation dose for all subsequent cycles.	Interrupt treatment until recovery of toxicity to \leq Grade 1

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Renal and hepatic impairment:

Table 2: Dose modifications for capecitabine and gemcitabine in renal and hepatic impairment

Drug	Renal Impairment		Hepatic Impairment
Capecitabine*	Creatinine Clearance (CrCl mL/min)	Dose	In the absence of safety and efficacy data in patients with hepatic impairment, capecitabine use should be carefully monitored in patients with mild to moderate liver dysfunction, regardless of the presence or absence of liver metastasis.
	≥30	100%	
	<30	Omit	
Gemcitabine	≥30	100%	If bilirubin ≥27 micromol/L, use dose of 800 mg/m ² and increase dose to full dose if tolerated.
	<30	Consider dose reduction – clinical decision.	

*Reference Table 7 for dose modification of capecitabine in treatment related hepatotoxicity

Management of adverse events:

Table 3: Dose Modification of gemcitabine for Adverse Events

Adverse reactions	Recommended dose modification of gemcitabine
Grade ≥ 2 Pneumonitis	Discontinue gemcitabine
Grade > 3 Non-haematological toxicity (except nausea/vomiting)	Therapy with gemcitabine should be withheld (until toxicity has resolved to grade ≤ 1) and may be resumed with 50% dose reduction or treatment discontinued at discretion of prescribing consultant.
Grade > 4 Non-haematological toxicity	Discontinue treatment

Table 4: Dose Modification of Capecitabine for Adverse Events

Toxicity grades*	Dose changes within a treatment cycle	Dose adjustment for next cycle/dose (% of starting dose)
Grade 1	Maintain dose level	Maintain dose level
Grade 2	Interrupt until resolved to grade 0-1	100%
• 1 st appearance		
• 2 nd appearance		
• 3 rd appearance		
• 4 th appearance	Discontinue permanently	
Grade 3	Interrupt until resolved to grade 0-1	75%
• 1 st appearance		
• 2 nd appearance		
• 3 rd appearance	Discontinue permanently	
Grade 4	Discontinue permanently OR If consultant deems it to be in patient's best interest to continue, interrupt until resolved to grade 0-1	50%
• 1 st appearance		
• 2 nd appearance	Discontinue permanently	

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Medication may be required for management of diarrhoea, e.g. loperamide (4mg at first onset followed by 2mg after each loose stool (max 16 mg /day) or see local policy.

*Common Terminology Criteria for Adverse Events (CTCAE) version 4.0.

Table 5: Dose Modification of capecitabine for diarrhoea

Grade	Diarrhoea	Dose changes within a treatment cycle	Dose adjustment for next cycle/dose (% of starting dose)
0-1	Increase of 2 to 3 stools/day or nocturnal stools	Maintain dose level	Maintain dose level
2	Increase of 4 to 6 stools/day or nocturnal stools	Interrupt until resolved to grade 0-1	100%
	• 1 st appearance		
	• 2 nd appearance		
	• 3 rd appearance		
	• 4 th appearance	Discontinue permanently	50%
3	Increase of 7 to 9 stools/day or incontinence	Interrupt until resolved to grade 0-1	75%
	• 1 st appearance		
	• 2 nd appearance	50%	
	• 3 rd appearance	Discontinue permanently	
4	Increase of 10 or more stools/day or grossly bloody diarrhoea; may require parenteral support	Discontinue permanently or If consultant deems it to be in patient's best interest to continue, interrupt until resolved to grade 0-1	50%
	• 1 st appearance		
	• 2 nd appearance	Discontinue permanently	

Medication may be required for management of diarrhoea, e.g. loperamide (4mg at first onset followed by 2mg after each loose stool (max 16 mg /day) or see local policy

Hand foot syndrome:

Table 6: Dose modification of capecitabine in hand foot syndrome

Toxicity Grade		Dose Modification
Grade 1	Skin changes (e.g., numbness, dysesthesia, paraesthesia, tingling, erythema) with discomfort not disrupting normal activities	100% Dose
Grade 2	Skin changes (e.g., erythema, swelling) with pain affecting activities of daily living	Withhold treatment until event resolves or decreases in intensity to grade 1.
Grade 3	Severe skin changes (e.g., moist desquamation, ulceration, blistering) with pain, causing severe discomfort and inability to work or perform activities of daily living	Withhold treatment until event resolves or decreases in intensity to grade 1. Subsequent doses of capecitabine should be decreased

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Treatment related hepatotoxicity

Table 7: Dose modification of capecitabine in treatment related hepatotoxicity

Bilirubin		ALT, AST	Dose Modification
> 3.0 x ULN	or	> 2.5 x ULN	Withhold treatment until bilirubin decreases to ≤ 3.0 x ULN or ALT, AST decrease to ≤ 2.5 x ULN

SUPPORTIVE CARE:

EMETOGENIC POTENTIAL:

Gemcitabine: Low (**Refer to local policy**)

Capecitabine: Minimal to low (**Refer to local policy**)

PREMEDICATIONS: Not usually required

OTHER SUPPORTIVE CARE: Medication may be required for management of diarrhoea, e.g. loperamide (4mg at first onset followed by 2mg after each loose stool (max 16 mg /day) (**Refer to local policy**).

ADVERSE EFFECTS / REGIMEN SPECIFIC COMPLICATIONS

The adverse effects listed are not exhaustive. Please refer to the relevant Summary of Product Characteristics for full details.

- **Neutropenia:** Fever or other evidence of infection must be assessed promptly and treated appropriately.

Gemcitabine:

- **Pulmonary Toxicity:** Acute shortness of breath may occur. Discontinue treatment with gemcitabine if drug-induced pneumonitis is suspected.
- **Cardiovascular:** Due to the risk of cardiac and/or vascular disorders with gemcitabine, particular caution must be exercised with patients presenting a history of cardiovascular events.
- **Haemolytic Uraemic syndrome:** Irreversible renal failure associated with hemolytic uremic syndrome may occur (rare) with gemcitabine. Use caution with pre-existing renal dysfunction.

Capecitabine:

- **Diarrhoea and dehydration:** This may be dose limiting with capecitabine therapy. Patients with severe diarrhoea should be carefully monitored and given fluid and electrolyte replacement if they become dehydrated.
- **Cardiotoxicity:** Angina-like chest pain, tachycardia, arrhythmias, heart failure, myocardial infarction and cardiac arrest may occur with capecitabine especially in patients with a prior history of coronary artery disease.

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- **Dihydropyrimidine dehydrogenase (DPD) deficiency:** DPD is an enzyme encoded by the DPYD gene which is responsible for the breakdown of fluoropyrimidines. Patients with DPD deficiency are therefore at increased risk of fluoropyrimidine-related toxicity, including for example stomatitis, diarrhoea, mucosal inflammation, neutropenia and neurotoxicity. Treatment with 5-Fluorouracil, capecitabine or tegafur-containing medicinal products is contraindicated in patients with known complete DPD deficiency. Consider a reduced starting dose in patients with identified partial DPD deficiency. Initial dose reduction may impact the efficacy of treatment. In the absence of serious toxicity, subsequent doses may be increased with careful monitoring. Therapeutic drug monitoring (TDM) of fluorouracil may improve clinical outcomes in patients receiving continuous 5-fluorouracil infusions.
- **Hand-foot syndrome (HFS):** HFS, also known as palmar-plantar erythrodysesthesia (PPE), is a common side effect associated with capecitabine (see Table 6 for dose modification of capecitabine for HFS).

DRUG INTERACTIONS:

- Capecitabine enhances the anticoagulant effect of warfarin. Patients taking coumarin derivative anticoagulants should be monitored regularly for alterations in their coagulation parameters and the anti-coagulant dose adjusted accordingly.
- Sorivudine inhibits dihydropyrimidine dehydrogenase thus increasing its toxicity. Therefore capecitabine must not be administered concomitantly with sorivudine or its chemically related analogues.
- Patients taking phenytoin or fosphenytoin concomitantly with capecitabine should be regularly monitored for increased phenytoin plasma concentrations.
- Current drug interaction databases should be consulted for more information.

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Version	Date	Amendment	Approved By
1	17/10/2018		Prof Maccon Keane
2	11/03/2020	Updated capecitabine dosing in renal impairment	Prof Maccon Keane
3	02/09/2020	Reviewed. Updated exclusion criteria, baseline testing, dose modifications and adverse events with respect to DPD deficiency as per DHPC from HPRA June 2020 Updated Adverse events regarding palmar-plantar erythrodysesthesia.	Prof Maccon Keane
4	18/01/2023	Updated dose modification for gemcitabine in hepatic impairment. Amended emetogenic potential.	Prof Maccon Keane
4a	13/03/2025	Additional wording added to baseline testing section.	NCCP

Comments and feedback welcome at oncologydrugs@cancercontrol.ie.

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