

## NCCP Classification Document for Systemic Anti- Cancer Therapy (SACT) Induced Nausea and Vomiting

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1	28 November 2018	Version 1	NCCP
2	16 December 2019	<ul style="list-style-type: none"> <li>• Addition of new section on drug interactions</li> <li>• Addition of CAR-T to areas excluded from this classification document</li> <li>• Emetogenic classification and treatment recommendations updated in line with references (NCCN updates)</li> <li>• Clarification of IV dexamethasone salt</li> </ul>	NCCP
3	18 March 2021	<ul style="list-style-type: none"> <li>• Emetogenic classification and treatment recommendations updated in line with references (NCCN and ASCO updates)</li> </ul>	NCCP
4	12 July 2022	<ul style="list-style-type: none"> <li>• Addition of new section on Medical Cannabis Access Programme (Section 4.4)</li> <li>• Tall Man lettering for OLANzapine and LORazepam</li> <li>• Addition of additional drugs to Table 7 and 8: tables updated in line with references.</li> <li>• Updated references</li> </ul>	NCCP
5	19 June 2023	<ul style="list-style-type: none"> <li>• Amended table 6 with regard to dose and route of admin for prochlorperazine</li> <li>• Updated emetogenic risk for pertuzumab IV</li> <li>• Update to footnotes in Table 3 and Table 7</li> </ul>	NCCP

All comments and feedback are welcome at [oncologydrugs@cancercontrol.ie](mailto:oncologydrugs@cancercontrol.ie)

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# 1 Background

Systemic Anti-Cancer Therapy (SACT) induced nausea and vomiting is one of the most frequent side effects experienced by patients undergoing SACT (1). Patients often find SACT induced nausea and vomiting distressing, and anxiety about the recurrence of such symptoms on future cycles of SACT may itself become a cause of anticipatory nausea and vomiting. The incidence of nausea associated with SACT is often underestimated by clinicians and it is not as well managed as emesis (2). Modern drug treatments can successfully control SACT induced nausea and vomiting for the majority of patients.

Currently, most hospitals delivering HSE funded SACT services maintain their own policy on the management of SACT induced nausea and vomiting and there are some variations between hospitals. The introduction of the National Cancer Information System (NCIS) presents a potential opportunity to include a series of standardised medicines as per the SACT risk categories. The NCCP has developed this document detailing the classification of:

- Emetogenic risk of SACT drugs
- Antiemetics to prevent and treat SACT induced nausea and vomiting

The classification included in this document does not apply to the treatment of:

- Paediatric patients
- Radiation-induced nausea and vomiting
- Patients receiving high-dose SACT for stem cell transplant
- Patients receiving Chimeric Antigen Receptor T-cell (CAR-T) therapy

This document is based on internationally accepted guidance on the emetogenic classification of drugs. Any clinician seeking to apply or consult these documents is expected to use independent medical judgement in the context of individual clinical circumstances to determine any patient's care or treatment. Please refer to local hospital antiemetic policy for more details on the treatment of SACT induced nausea and vomiting		
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## 2 Introduction

SACT agents are classified into four levels of emetogenicity (high, moderate, low and minimal) based on the percentage of patients who experience emesis having not receiving antiemetic prophylaxis (3, 4). This classification has been used as a framework for treatment guidelines internationally (3-6).

The emetogenic potential of:

- Parenteral SACT is detailed in Table 7
- Oral SACT/Oral Anti-Cancer Medicines (OAM) is detailed in Table 8

The following points should be considered when prescribing antiemetics for patients receiving SACT drugs:

- The goal of antiemetic therapy is prevention of nausea/vomiting
- Prophylaxis is better than treatment; therefore escalate rapidly if treatment is failing
- The emetogenic potential of the SACT must be considered when deciding which antiemetics to prescribe
- For patients receiving combination SACT, antiemetic treatment should be determined according to the SACT with the greatest degree of emetogenic risk (3)
- Adult patients who are treated with multi-day SACT should be offered antiemetics before treatment that are appropriate for the emetogenic risk of the SACT administered on each day of the SACT treatment and for two days after (3)
- Antiemetics should always commence before SACT with oral doses administered at least 30 minutes before SACT is initiated
- Consideration should be given to using a H<sub>2</sub> blocker or proton pump inhibitor to prevent dyspepsia which can mimic nausea (5)
- Optimal emetogenic control of acute emesis is essential to prevent delayed emesis

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### 3 Types of Nausea and Vomiting

The types of SACT induced nausea and vomiting experienced by patients may be subdivided as detailed in Table 1 and influences the optimal treatment option.

**Table 1 Types of nausea and vomiting (5)**

Type of Emesis	Description
<b>Acute</b>	Nausea and vomiting experienced usually within a few minutes to several hours after drug administration and which commonly resolves within the first 24 hours.
<b>Delayed-onset</b>	Nausea and vomiting developing more than 24 hours after SACT administration and which may last for up to 6 - 7 days.
<b>Breakthrough</b>	Development of nausea and vomiting, despite prophylactic treatment and/or requires rescue with antiemetic agents.
<b>Anticipatory</b>	Nausea and vomiting that occurs prior to the beginning of a new cycle of SACT. It is primarily considered a conditioned response and typically occurs after a negative past experience with SACT.
<b>Refractory</b>	Nausea and/or vomiting that occur during subsequent treatment cycles when antiemetic prophylaxis and/or rescue have not been effective in earlier cycles.

The treatment of anticipatory and refractory emesis is not dealt with in this classification document.

## 4 Antiemetics to prevent and treat SACT induced nausea and vomiting

The antiemetics to prevent and treat SACT induced nausea and vomiting for:

- Parenteral SACT are detailed in Table 2 and Table 3
- Oral SACT (OAM) are detailed in Table 5

These tables should be used to choose the agent and identify the dosing for the appropriate locally approved agents.

Some medications listed on these tables may not be available on the Community Drug Schemes (CDS) including the High Tech arrangements of the PCRS community drug schemes but may be used locally at hospital level with the cost borne by the hospital.

Inclusion of medications in this table does not denote NCCP endorsement of any product.

### 4.1 Parenteral SACT

Table 2 Emetogenic risk and associated Antiemetic Regimens Drug Classifications for parenteral SACT

Emetogenic Risk	Antiemetic Regimen*
<b>High (&gt;90% risk of emesis)</b>	<b>NK<sub>1</sub> Receptor Antagonist and 5-HT<sub>3</sub> Receptor Antagonist and Corticosteroid and OLANzapine<sup>†</sup></b>
<b>Moderate (&gt;30-90% risk of emesis)</b>	<b>5-HT<sub>3</sub> Receptor Antagonist and Corticosteroid</b>
<b>Low (10-30% risk of emesis)</b>	<b>5-HT<sub>3</sub> Receptor Antagonist or Corticosteroid</b>
<b>Minimal(&lt;10% risk of emesis)</b>	<b>No routine prophylaxis required</b>

5-HT<sub>3</sub>, 5-hydroxytryptamine-3; NK<sub>1</sub>, neurokinin 1;

\*+/- H<sub>2</sub> Blocker or a proton pump inhibitor to prevent dyspepsia which can mimic nausea

<sup>†</sup>Unlicensed indication

Table 3 Antiemetic Dosing\* † for Adults by parenteral SACT Risk Category

EMETOGENIC RISK	Day of SACT			Subsequent Days
HIGH	Oral Dose		IV Dose	
<b>NK<sub>1</sub> Receptor Antagonist and 5-HT<sub>3</sub> Receptor Antagonist (plus corticosteroid)</b>				
Netupitant /Palonosetron	300mg/0.5mg		N/A	None
<b>NK<sub>1</sub> Receptor Antagonist: Choose one of the following (plus 5-HT<sub>3</sub> Receptor Antagonist plus corticosteroid)</b>				
Aprepitant	125mg		N/A	80mg PO once daily on days 2 and 3
Fosaprepitant	N/A		150mg	None
Rolapitant	180mg		N/A	
<b>+ 5-HT<sub>3</sub> Receptor Antagonist: Choose one of the following (plus NK<sub>1</sub> Receptor Antagonist plus corticosteroid)</b>				
Granisetron	2mg	or	1mg or 0.01mg/kg	None
	OR 10mg subcutaneous			
Ondansetron	16-24mg once daily	or	8-16mg or 0.15mg/kg	
Palonosetron (7)	0.5mg	or	0.25mg	
<b>Other antiemetic agents</b>				
<b>+/- OLANzapine</b>	<b>5-10mg PO (5mg if elderly or over-sedated)</b>		<b>5-10mg PO once daily on days 2-4</b>	
<b>+ Corticosteroid (plus NK<sub>1</sub> Receptor Antagonist plus 5-HT<sub>3</sub> Receptor Antagonist)</b>				
Dexamethasone, <sup>a,b</sup>	<b>Dexamethasone dose</b>			
If netupitant/palonosetron is used	12mg	or	12mg	8mg PO or IV <sup>c</sup> once daily on days 2 - 4
If aprepitant is used	12mg	or	12mg	
If fosaprepitant is used	12mg	or	12mg	8mg PO or IV <sup>c</sup> on day 2
If rolapitant is used	20mg	or	20mg	8mg PO or IV <sup>c</sup> twice daily on days 3 and 4
If OLANzapine is used	12mg	or	12mg	8mg PO or IV <sup>c</sup> twice daily on days 2 - 4
				8mg PO once daily on days 2-4
				None if Anthracycline and Cyclophosphamide
MODERATE	Oral Dose		IV Dose	
<b>5-HT<sub>3</sub> Receptor Antagonist : Choose one of the following (Plus corticosteroid)</b>				
Granisetron	2mg	or	1mg or 0.01mg/kg	None
	OR 10mg subcutaneous			
Ondansetron	8mg twice daily or 16-24mg once daily	or	8-16mg or 0.15mg/kg	
Palonosetron	0.50mg	or	0.25mg	
<b>Corticosteroid (plus 5-HT<sub>3</sub> Receptor Antagonist)</b>				
Dexamethasone, <sup>a,b</sup>	8-12mg	or	8-12mg <sup>c</sup>	8mg PO or IV <sup>c</sup> once daily on days 2 and 3
LOW	Oral Dose		IV Dose	
<b>5-HT<sub>3</sub> Receptor Antagonist : Choose one of the following</b>				
Granisetron	2mg	or	1mg or 0.01mg/kg	None
	OR 10mg subcutaneous			
Ondansetron	8-16mg once daily	or	8mg or 0.15mg/kg	
Palonosetron	0.50mg	or	0.25mg	
<b>OR</b>				
<b>Corticosteroid – Dexamethasone<sup>a,b</sup></b>	8-12mg	or	8-12mg <sup>c</sup>	None
MINIMAL				
No routine prophylaxis required				

5-HT<sub>3</sub>, 5-hydroxytryptamine-3; IV, intravenous; NK<sub>1</sub>, neurokinin 1; PO, oral; IV intravenous

<sup>a</sup> Dexamethasone dose may be modified or omitted where the SACT regimen already includes a steroid.

<sup>b</sup> Consider avoiding the use of corticosteroid premedications with immune checkpoint inhibitors.

<sup>c</sup> Dose of dexamethasone IV refers to dexamethasone phosphate. Consideration of dose adjustment is required if using an alternate salt.

\*+/- H<sub>2</sub> Blocker or a proton pump inhibitor to prevent dyspepsia which can mimic nausea.

† Potential drug interactions between antineoplastic/antiemetic therapies and various other drugs should always be considered, e.g. consider increased risk of vinca alkaloid-induced adverse effects due to inhibition of CYP3A4 by aprepitant.

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**Table 4 Caution on IV Ondansetron dosing**

IV ondansetron causes a dose-dependent prolongation of the QT interval. A single dose of IV ondansetron given for SACT induced nausea and vomiting in adults
<ul style="list-style-type: none"> <li>• must not exceed 8mg infused in 50-100ml sodium chloride 0.9% over at least 15minutes in patients greater than 75 years</li> <li>• must not exceed 16mg infused in 50-100ml sodium chloride 0.9% over at least 15minutes in patients less than 75 years</li> <li>• repeat IV dosing should be given no less than 4 hours apart (8).</li> </ul>

## 4.2 Oral SACT

There is a lack of clinical trials evaluating the prevention and treatment of nausea and vomiting associated with OAMs as well as divergence in the international recommendations and classifications of the emetogenic potential of OAMs. Due to the continuous administration for many OAMs, the use of steroids is not ideal.

OAMs have been classified as moderate-high and minimal-low in line with the NCCN classification of OAMs.

**Table 5 Antiemetic Dosing\* for Adults by OAM SACT Risk Category**

EMETOGENIC RISK	Day of SACT	Subsequent Days
<b>Moderate-High</b>	<b>Dose to be given – PO</b>	
<b>5-HT<sub>3</sub> Receptor Antagonist: Choose one of the following</b>		
Granisetron	1-2mg (total dose) daily	Continue daily
Ondansetron	8mg - 16mg (total dose) daily	Continue daily
<b>Minimal-Low</b>	<b>Treat with antiemetics only on “as required” basis</b>	
Metoclopramide	10mg three times daily	Continue as required
<b>OR</b>		
Prochlorperazine	10mg and then every 6 hours as needed (maximum 40mg/day)	Continue as required
<b>OR</b>		
<b>5-HT<sub>3</sub> Receptor Antagonist: Choose one of the following</b>		
Granisetron	1-2mg (total dose) daily PRN	Continue as required
Ondansetron	8mg - 16mg (total dose) daily PRN	Continue as required

\*+/- H<sub>2</sub> Blocker or a proton pump inhibitor to prevent dyspepsia which can mimic nausea

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### 4.3 Breakthrough Emesis

For patients with breakthrough nausea and vomiting clinicians should re-evaluate emetogenic risk, disease status, concurrent illnesses and medications and ascertain that the best regimen is being administered for the emetogenic risk (3).

The general principle of treatment for breakthrough emesis is to add an additional antiemetic with a different mechanism of action than that of the current prophylactic regimen (e.g. an NK<sub>1</sub> receptor antagonist, a benzodiazepine, a dopamine receptor antagonist) in addition to continuing the standard antiemetic regimen (3). ASCO recommend that patients be offered OLANzapine where not previously given and where already on optimal prophylaxis (3, 9).

Table 6 lists antiemetic agents available for the treatment of breakthrough emesis for both parenteral SACT and OAM. These antiemetics for breakthrough emesis should be continued on a regular schedule rather than an as required schedule (5). If emesis persists, re-evaluate patients and either dose adjust or consider changing antiemetic therapy to higher level treatment for the next cycle.

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**Table 6 Additional treatment options for Breakthrough SACT Induced Nausea and Vomiting (Parenteral & OAM)**

Drug Class	Drug	Recommended Dose
Antihistamine	Cyclizine	50mg PO/IV three times daily
Benzodiazepine	LORazepam	0.5-2mg PO every 6 hours
Dopamine Receptor Antagonist	<sup>a</sup> Domperidone	10mg PO three times daily
	or	
	Metoclopramide	10mg PO/IV three times daily
Phenothiazine	Prochlorperazine	12.5mg IM followed by oral dosage 6 hours later if required (10)
	Promethazine	12.5-25mg PO/IV (central line only) every 4-6hours
<sup>b</sup> Other	Haloperidol	0.5-2mg PO/IV every 4-6hours
	Scopolamine <sup>c</sup>	1.5mg transdermal patch every 72hours (1mg scopolamine)
<b>Steroids, NK1, 5HT3 receptor antagonists and OLANzapine may also be added where have not been used previously, see Table 3 for details.</b>		

<sup>a</sup> Domperidone has been associated with an increased risk of serious ventricular arrhythmias or sudden cardiac death. A higher risk was observed in patients older than 60 years, patients taking daily doses greater than 30 mg, and patients concurrently taking QT-prolonging drugs or CYP3A4 inhibitors. Domperidone should be used at the lowest effective dose for the shortest duration necessary to control nausea and vomiting (11).

<sup>b</sup> This is not an exhaustive list of additional treatment options. Other options may be recommended by the patient's clinician.

<sup>c</sup> Unlicensed indication

#### 4.4 Medical Cannabis Access Programme

For cases of intractable nausea and vomiting associated with chemotherapy (CINV), consideration can be given to the use of medical cannabis products under the Medical Cannabis Access Programme<sup>1</sup> (MCAP) (12).

The MCAP facilitates access to cannabis-based products for medical use in line with the Department of Health's Clinical Guidance on Cannabis for Medical Use (13).

The Department of Health have issued the following guidance documents:

- Clinical Guidance on Cannabis for Medical Use (13)
- Additional Information/FAQs

<sup>1</sup> <https://www.gov.ie/en/publication/90ece9-medical-cannabis-access-programme/>

Both documents are available [here](#).

Information from the HPRA on the use of cannabis for medical use is available [here](#).

## 5 Drug Interactions

The Summary of Product Characteristics (SmPC) and current drug interaction databases should be consulted for the most up to date information regarding drug interactions.

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## 6 Classification of Emetogenic Potential for SACT Drugs

Table 7 Emetogenic risk of parenteral SACT drugs <sup>a</sup>

High Risk (>90% frequency of emesis)		
Anthracycline/Cyclophosphamide combination CARBOplatin AUC ≥ 4 Carmustine > 250mg/m <sup>2</sup> CISplatin	Cyclophosphamide > 1500mg/m <sup>2</sup> Dacarbazine DOXOrubicin ≥ 60mg/m <sup>2</sup> epiRUBicin > 90mg/m <sup>2</sup> Ifosfamide ≥ 2g/m <sup>2</sup>	Mechlorethamine Melphalan ≥ 140mg/m <sup>2</sup> Sacituzumab govitecan Streptozotocin
Moderate Risk (30-90% patients)		
Aldesleukin > 12-15 million IU/m <sup>2</sup> Alemtuzumab Amifostine > 300mg/m <sup>2</sup> Arsenic trioxide AzaCITidine Bendamustine Busulfan CARBOplatin AUC < 4 Carmustine ≤ 250mg/m <sup>2</sup> Clofarabine	Cyclophosphamide ≤ 1500mg/m <sup>2</sup> Cytarabine > 1000mg/m <sup>2</sup> DACTINomycin DAUNOrubicin Dual drug liposomal encapsulation of DAUNOrubicin and cytarabine Dinutuximab DOXOrubicin < 60mg/m <sup>2</sup> epiRUBicin ≤ 90mg/m <sup>2</sup>	Fam-trastuzumab deruxtecan-nxki IDArubicin Ifosfamide < 2g/m <sup>2</sup> Irinotecan Irinotecan (liposomal) Melphalan < 140mg/m <sup>2</sup> Methotrexate ≥ 250mg/m <sup>2</sup> Oxaliplatin Thiotepa Trabectedin
Low Risk (10-30% patients)		
Aflibercept Aldesleukin ≤ 12million IU/m <sup>2</sup> Amifostine ≤ 300mg/m <sup>2</sup> Axicabtagene ciloleucel Blinatumomab Bortezomib Brentuximab vedotin Cabazitaxel Carfilzomib Cetuximab Copanlisib Cytarabine ≤ 1000mg/m <sup>2</sup> Decitabine DOCEtaxel	Enfortumab vedotin-efv eriBULin Etoposide 5-Fluorouracil Gemcitabine Gemtuzumab ozogamicin Inotuzumab ozogamicin Ipilimumab Isatuximab-irfc Methotrexate <250mg/m <sup>2</sup> MitoMYcin MitoXANTRONE Mogamulizumab Nab-PACLitaxel	Nelarabine PACLitaxel Panitumumab Pegylated liposomal DOXOrubicin PEMEtrexed Pentostatin  Polatuzumab vedotin Tamlimogene laherparepvec Temsirolimus Tisagenlecleucel Topotecan Trastuzumab emtansine
Minimal (<10% patients)		
Asparaginase Atezolizumab Avelumab Bevacizumab Bleomycin Cemiplimab  Cladribine Daratumumab Dexrazoxane	Durvalumab Fludarabine Nivolumab Obinutuzumab Ofatumumab Pegaspargase Pembrolizumab Pertuzumab Pertuzumab/trastuzumab sub-cutaneous	Pixantrone Ramucirumab riTUXimab Siltuximab Trastuzumab VinBLAStine  VinCRISStine VinCRISStine (liposomal) Vinorelbine
<sup>a</sup> Potential drug interactions between antineoplastic/antiemetic therapies and various other drugs should always be considered, e.g. consider increased risk of vinca alkaloid-induced adverse effects due to inhibition of CYP3A4 by aprepitant		

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**Table 8 Emetogenic risk of oral SACT drugs<sup>a</sup> (OAMs)**

Moderate to High $\geq 30\%$	
Abemaciclib	Lomustine (single day)
Binimetinib	Midostaurin
Busulfan $\geq 4\text{mg/day}$	Mitotane
Bosutinib $> 400\text{mg/day}$	Niraparib
Ceritinib	Olaparib
Crizotinib	Procarbazine
Cyclophosphamide $\geq 100\text{mg/m}^2/\text{day}$	Ribociclib
Dabrafenib	Selinexor
Encorafenib	Temozolomide $\geq 75\text{mg/m}^2/\text{day}$
Imatinib $> 400\text{mg/day}$	Trifluridine/tipiracil
Lenvatinib $> 12\text{mg/day}$	Vinorelbine
Minimal to Low $< 30\%$	
Acalabrutinib	Lenvatinib $\leq 12\text{mg/day}$
Afatinib	Lorlatinib
Alectinib	Melphalan
Alpelisib	Mercaptopurine
Axatinib	Methotrexate
Bosutinib $\leq 400\text{mg/day}$	Neratinib
Brigatinib	Nilotinib
Busulphan ( $< 4\text{mg/day}$ )	Osimertinib
Cabozantinib	Palbociclib
Capecitabine	Panobinostat
Chlorambucil	PAZOPanib
Cobimetinib	Pomalidomide
Cyclophosphamide $< 100\text{mg/m}^2/\text{day}$	PONATinib
Dacomitinib	Pralsetinib
Dasatinib	Regorafenib
Duvelisib	Ruxolitinib
Entrectinib	Selpercatinib
Erlotinib	SORAFenib
Etoposide	SUNItinib
Everolimus	Talazoparib tosylate
Fludarabine	Temozolomide ( $< 75\text{mg/m}^2/\text{day}$ )
Gefitinib	Thalidomide
Gilteritinib	Thioguanine
Glasdegib	Topotecan
Hydroxyurea	Trametinib
Ibrutinib	Tretinoin
Idelalisib	Tucatinib
Imatinib $\leq 400\text{mg/day}$	Vandetanib
Ivosidenib	Vemurafenib
Ixazomib	Venetoclax
Lapatinib	Vismodegib
Larotrectinib	Vorinostat
Lenalidomide	Zanubrutinib

<sup>a</sup> Potential drug interactions between antineoplastic/antiemetic therapies and various other drugs should always be considered

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This document is based on internationally accepted guidance on the emetogenic classification of drugs. Any clinician seeking to apply or consult these documents is expected to use independent medical judgement in the context of individual clinical circumstances to determine any patient's care or treatment. Please refer to local hospital antiemetic policy for more details on the treatment of SACT induced nausea and vomiting		
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