Thromboembolism

Venous thromboembolism can be a complication of cancer itself, but chemotherapy increases the risk.

Tumour lysis syndrome

Tumour lysis syndrome occurs secondary to spontaneous or treatment related rapid destruction of malignant cells. Patients at risk of tumour lysis syndrome include those with non- Hodgkin's lymphoma (especially if high grade and bulky disease), Burkitt's lymphoma, acute lymphoblastic leukaemia and acute myeloid leukaemia (particularly if high white blood cell counts or bulky disease), and occasionally those with solid tumours. Pre-existing hyperuricaemia, dehydration and renal impairment are also predisposing factors. Features, include hyperkalaemia, hyperuricaemia, and hyperphosphataemia with hypocalcaemia; renal damage and arrhythmias can follow. Early recognition of patients at risk, and initiation of prophylaxis or therapy for tumour lysis syndrome, is essential.

Treatment of cytotoxic drug side-effects

Hyperuricaemia

Hyperuricaemia, which may be present in high-grade lymphoma and leukaemia, can be markedly worsened by chemotherapy and is associated with acute renal failure.

Allopurinol p. 576 is used routinely in children at low to moderate risk of hyperuricaemia. It should be started 24 hours before treatment; patients should be adequately hydrated (consideration should be given to omitting phosphate and potassium from hydration fluids). The dose of mercaptopurine p. 562 or azathioprine p. 536 should be reduced if allopurinol is given concomitantly.

Rasburicase p. 576 is a recombinant urate oxidase used in children who are at high-risk of developing hyperuricaemia. It rapidly reduces plasma-uric acid concentration and may be of particular value in preventing complications following treatment of leukaemias or bulky lymphomas.

Methotrexate-induced mucositis and myelosuppression

Folinic acid p. 575 (given as calcium folinate) is used to counteract the folate-antagonist action of methotrexate and thus speed recovery from methotrexate-induced mucositis or myelosuppression ('folinic acid rescue').

The calcium salt of levofolinic acid p. 575, a single isomer of folinic acid, is also used following methotrexate administration. The dose of calcium levofolinate is generally half that of calcium folinate.

The disodium salts of folinic acid and levofolinic acid are also used for rescue therapy following methotrexate administration.

The efficacy of high dose methotrexate is enhanced by delaying initiation of folinic acid for at least 24 hours, local protocols define the correct time. Folinic acid is normally continued until the plasma-methotrexate concentration falls to 45–90 nanograms/mL (100–200 nanomol/litre).

In the treatment of methotrexate p. 563 overdose, folinate should be administered immediately; other measures to enhance the elimination of methotrexate are also necessary.

Urothelial toxicity

Haemorrhagic cystitis is a common manifestation of urothelial toxicity which occurs with the oxazaphosphorines, cyclophosphamide p. 555 and ifosfamide p. 556; it is caused by the metabolite acrolein. Adequate hydration is essential to reduce the risk of urothelial toxicity. Mesna p. 574 reacts specifically with acrolein in the urinary tract, preventing toxicity. Mesna is given for the same duration as cyclophosphamide or ifosfamide. It is generally given intravenously; the dose of mesna is equal to or greater than that of the oxazaphosphorine.

Cytotoxic antibiotics

Cytotoxic antibiotics are widely used. Many act as radiomimetics and simultaneous use of radiotherapy should be **avoided** because it may markedly increase toxicity.

Daunorubicin p. 558, doxorubicin hydrochloride p. 559, and epirubicin hydrochloride p. 560 are anthracycline antibiotics. Mitoxantrone p. 560 (mitozantrone) is an anthracycline derivative.

Epirubicin hydrochloride and mitoxantrone are considered less toxic than the other anthracycline antibiotics, and may be suitable for children who have received high cumulative doses of other anthracyclines.

Vinca alkaloids

The vinca alkaloids, vinblastine sulfate p. 569 and vincristine sulfate p. 570 are used to treat a variety of cancers including leukaemias, lymphomas, and some solid tumours.

Antimetabolites

Antimetabolites are incorporated into new nuclear material or they combine irreversibly with cellular enzymes and prevent normal cellular division. Cytarabine p. 561, fludarabine phosphate p. 562, mercaptopurine p. 562, methotrexate, and tioguanine p. 566 are commonly used in paediatric chemotherapy.

Other antineoplastic drugs

Asparaginase

Asparaginase is used almost exclusively in the treatment of acute lymphoblastic leukaemia. Hypersensitivity reactions may occur and facilities for the management of anaphylaxis should be available. A number of different preparations of asparaginase exist and only the product specified in the treatment protocol should be used.

ANTINEOPLASTIC DRUGS › ALKYLATING AGENTS

Busulfan

(Busulphan)

● **INDICATIONS AND DOSE**

Conditioning treatment before haematopoietic progenitor cell transplantation

- BY MOUTH, OR BY INTRAVENOUS INFUSION
- Child: (consult local protocol)

DOSES AT EXTREMES OF BODY-WEIGHT

- Dose may need to be calculated based on body surface area or adjusted ideal body weight in obese patients—consult product literature.

IMPORTANT SAFETY INFORMATION

RISKS OF INCORRECT DOSING OF ORAL ANTI-CANCER MEDICINES

See Cytotoxic drugs p. 551.

● **CAUTIONS** Avoid in Acute porphyrias p. 624 · high dose (antiepileptic prophylaxis required) · history of seizures (antiepileptic prophylaxis required) · ineffective once in blast crisis phase · previous progenitor cell transplant (increased risk of hepatic veno-occlusive disease) · previous radiation therapy (increased risk of hepatic veno-occlusive disease) · risk of second malignancy · three or more cycles of chemotherapy (increased risk of hepatic veno-occlusive disease)

● **INTERACTIONS** → Appendix 1: alkylating agents

● **SIDE-EFFECTS**

GENERAL SIDE-EFFECTS

- **Common or very common** Alopecia · diarrhoea · hepatic disorders · nausea · respiratory disorders · sinusoidal obstruction syndrome · skin reactions · thrombocytopenia · vomiting