

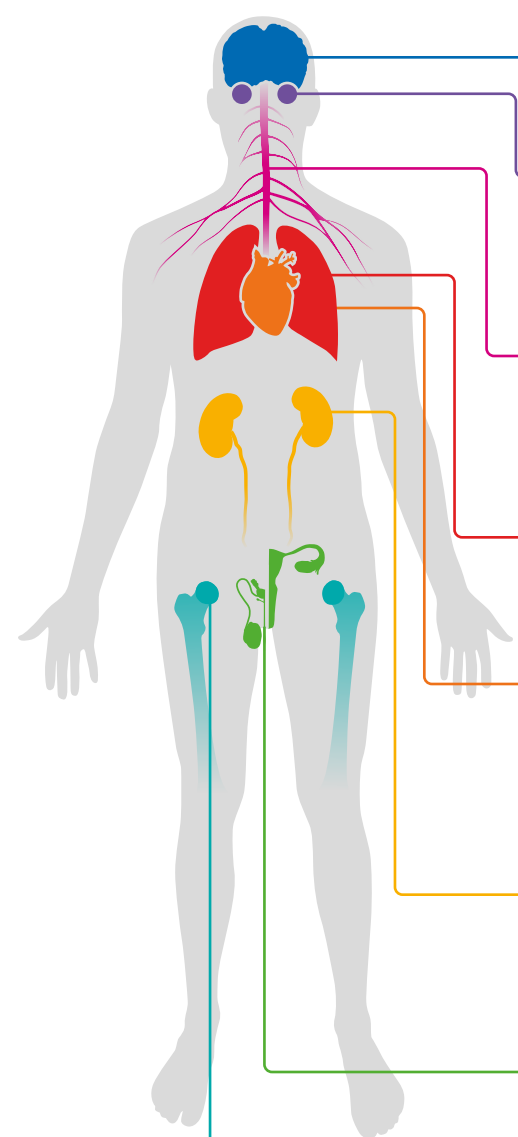
# Managing long term side effects of chemotherapy

Teenagers and young adults (TYA) who survive cancer treatment can have a range of side effects later in life. If it is known which chemotherapeutic agents were used, the "Principal causative drugs" column can guide monitoring and management. Factors that further increase the risk of complications from chemotherapy are listed in the "risk groups" section.

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Side Effect	Principal causative drugs	Risk groups	Managing those at risk
<b>Loss of executive function</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other	Concurrent cranial RT <sup>3</sup>	Baseline MMSE <sup>4</sup> (Repeat if symptoms). Consider: Neurorehabilitation, Psychotropic drugs. Encourage communication with school/university/place of work. Consider referral to: Social worker, Psychologist, Occupational therapist.
<b>Memory loss</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other	Concurrent cranial RT <sup>3</sup>	Funduscopy (Every year). Refer to ophthalmology if symptoms.
<b>Cataract</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other	Concurrent RT <sup>3</sup>	Funduscopy (Every year). Refer to ophthalmology if symptoms.
<b>Peripheral neuropathy</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Smoking	Neurological examination (Every year for first 3 years, then after symptoms change). Consider: Hearing aid, Speech therapy, Assessment of reversible causes. Offer advice: Against smoking, Respiratory specialist review before anaesthesia or SCUBA diving.
<b>Tinnitus</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other	Smoking	Baseline audiological assessment (Repeat if symptoms). Refer to ENT specialist if changes. Consider: Hearing aid, Speech therapy, Assessment of reversible causes. Offer advice: Against smoking, Respiratory specialist review before anaesthesia or SCUBA diving.
<b>Deafness</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other	Smoking	Baseline audiological assessment (Repeat if symptoms). Refer to ENT specialist if changes. Consider: Hearing aid, Speech therapy, Assessment of reversible causes. Offer advice: Against smoking, Respiratory specialist review before anaesthesia or SCUBA diving.
<b>Raynaud's phenomenon</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Smoking	Warm gloves in winter. Calcium channel blockers. Vaccinations: Influenza, Pneumococcal.
<b>Pulmonary fibrosis</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Smoking, Younger, HD <sup>1</sup> , Exposure to high O <sub>2</sub> concentration, Renal dysfunction, +RT <sup>3</sup>	Baseline tests: Chest radiograph, Lung function. Respiratory examination (Every year). Vaccinations: Influenza, Pneumococcal.
<b>Ventricular failure</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	CVS risks: Smoking, Diabetes, High cholesterol; Mediastinal RT <sup>3</sup> , High dose, Time since chemo; Pregnancy	Encourage early presentation (Cardiac disease may occur at much younger ages in people who have had chemotherapy). MUGA <sup>5</sup> /echocardiogram (Every year). Consider ECG and blood pressure.
<b>Coronary artery disease</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	CVS risks: Smoking, Diabetes, High cholesterol; Mediastinal RT <sup>3</sup> , High dose, Time since chemo; Pregnancy	Encourage early presentation (Cardiac disease may occur at much younger ages in people who have had chemotherapy). MUGA <sup>5</sup> /echocardiogram (Every year). Consider ECG and blood pressure.
<b>Hypertension</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	CVS risks: Smoking, Diabetes, High cholesterol; Mediastinal RT <sup>3</sup> , High dose, Time since chemo; Pregnancy	Encourage early presentation (Cardiac disease may occur at much younger ages in people who have had chemotherapy). MUGA <sup>5</sup> /echocardiogram (Every year). Consider ECG and blood pressure.
<b>Chronic kidney disease</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Prior renal dysfunction, Diabetes	Blood pressure (Every year), Urinalysis (Every year). Baseline urea and electrolytes (Repeat if symptoms or signs of renal failure).
<b>Haemorrhagic cystitis</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Concurrent RT <sup>3</sup> to urinary tract	Encourage self reporting (Advise patient to report potential symptoms). Refer to renal specialist if deterioration in symptoms or results.
<b>Renal tract malignancy</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Concurrent RT <sup>3</sup> to urinary tract	Encourage self reporting (Advise patient to report potential symptoms). Refer to renal specialist if deterioration in symptoms or results.
<b>Infertility</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Older age at time of treatment, +RT <sup>3</sup> to gonadal region, Higher cumulative doses	Fertility preservation (Refer all TYA <sup>7</sup> undergoing chemotherapy to fertility preservation services). Baseline bloods: Men (Testosterone), Women (LH, FSH, Oestradiol). Hormone replacement.
<b>Primary hypogonadism</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Older age at time of treatment, +RT <sup>3</sup> to gonadal region, Higher cumulative doses	Fertility preservation (Refer all TYA <sup>7</sup> undergoing chemotherapy to fertility preservation services). Baseline bloods: Men (Testosterone), Women (LH, FSH, Oestradiol). Hormone replacement.
<b>Necrosis of femoral head</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	Concurrent RT <sup>3</sup>	Clinical examination (Every year). Refer for MRI if clinical suspicion.
<b>Second malignant neoplasm</b>	Alkylating agents: Busulfan, Cisplatin, Cyclophosphamide, Ifosfamide, Other; Anthracyclines; Antimetabolites; Bevacizumab; Bleomycin; Prednisolone HD <sup>1</sup> ; Taxanes; Trastuzumab; Vincristine; Vinorelbine; Topo II inhibitors <sup>2</sup>	High dose, +RT <sup>3</sup> , t-AML survivors, Autologous stem cell transplant	Full blood count for t-AML survivors (Every year). After thoracic radiotherapy: Enhanced breast cancer surveillance. Breast self-exam (Every month).
<b>Psychosocial problems</b>	Possible with all chemotherapy	CNS tumour, Hearing loss, Female, Younger, Cranial RT <sup>3</sup> , Learning difficulties, Lower SEG <sup>6</sup>	Psychosocial assessment (Every year). Support groups, Psychology referral, Counselling, Antidepressants, Anxiolytics. Assess impact on family members and carers.
<b>Fatigue</b>	Most chemotherapeutic agents	Depression	Psychosocial assessment (Every year). Screen for underlying depression, Rule out reversible causes, Advise short bursts of exercise.
<b>Osteoporosis</b>	Most chemotherapeutic agents	Smoking	Bone density scan (Calcium and vitamin D according to results). Rule out hypogonadism.

**Psychosocial effects of chemotherapy include:**

- Post-traumatic stress disorder
- Financial burden
- Depression
- Employment difficulties
- Social isolation
- Educational difficulties
- Strained relationships with partner, family, and peers

<sup>1</sup>HD = High dose    <sup>2</sup>Topoisomerase II inhibitors    <sup>3</sup>RT = radiotherapy    <sup>4</sup>Mini Mental State Examination    <sup>5</sup>Multigated acquisition scan    <sup>6</sup>SEG = socio-economic grouping    <sup>7</sup>TYA = teenagers and young adults