TABLE 125-2 LONG-TERM TREATMENT EFFECTS BY CANCER TYPE

Cancer Type	Late Effects
Pediatric cancers	Majority have at least one late effect
	30% with moderate/severe problems
	Cardiovascular: radiation, anthracyclines
	Lungs: radiation
	Skeletal abnormalities: radiation
	Psychological, cognitive, and sexual problems
	Second neoplasms significant cause of death
Hodgkin's lymphoma	Thyroid dysfunction: radiation
	Premature coronary artery disease: radiation
	Gonadal dysfunction: chemotherapy
	Postsplenectomy sepsis
	Myelodysplasia
	Acute myeloid leukemia
	Non-Hodgkin's lymphomas
	Breast cancer, lung cancer, and melanoma
	Fatigue, psychological and sexual problems
	Peripheral neuropathy
Non-Hodgkin's lymphoma	Myelodysplasia
	Acute leukemia
	Bladder cancer
	Peripheral neuropathy
Acute leukemia	Second malignancies: hematologic, solid tumors
	Neuropsychiatric dysfunction
	Subnormal growth
	Thyroid abnormalities
	Infertility
Bone marrow stem cell transplantation	Infertility
	Graft-versus-host disease (allogeneic transplant)
	Psychosexual dysfunction.
Head and neck cancer	Poor dentition, dry mouth, poor nutrition: radiation
Breast cancer	Tamoxifen: endometrial cancer, blood clots
	Aromatase inhibitors: osteoporosis, arthritis
	Cardiomyopathy: anthracycline ± radiation, trastuzumab
	Acute leukemia
	Hormone deficiency symptoms: hot flashes, vaginal dryness, dyspareunia
	Psychosocial dysfunction
	"Chemo brain"
Testicular cancer	Raynaud's phenomenon
	Renal dysfunction
	Pulmonary dysfunction
	Retrograde ejaculation: surgery
	15% sexual dysfunction
Colon cancer	Major risk is second colon cance.
	Quality of life high in survivors
Prostate cancer	Impotence
	Urinary incontinence (0–15%)
	Chronic proctitis, prostatitis/cystitis: radiation

B cell lymphoproliferative disorder. The incidence at 10 years after T cell depletion is 9–12%. Discontinuing immunosuppressive therapy, if possible, is often associated with complete disease regression.

RECOMMENDATIONS FOR FOLLOW-UP

All former cancer patients should be followed indefinitely. This is most often done by oncologists, but demographic changes suggest that more primary care physicians will need to be trained in the follow-up of treated cancer patients in remission. Cancer patients need to be educated about signs and symptoms of recurrence and potentially adverse effects related to therapy. Localized pain or palpable abnormality in a previously radiated field should prompt radiographic evaluation. Screening tests, when available and validated, should be used on a routine and regular basis (e.g., mammography and Pap smear), particularly in patients receiving radiation to specific organs. Annual mammography should start no later than 10 years after breast radiation. Patients receiving radiation fields encompassing thyroid tissue should have regular thyroid exams and TSH testing. Patients treated with alkylating agents or topoisomerase inhibitors should have a complete blood count every 6–12 months, and cytopenias, abnormal cells on peripheral smear, or macrocytosis should be evaluated with bone marrow biopsy and aspirate, to include cytogenetics, flow cytometry, or fluorescence in situ hybridization (FISH) studies as appropriate.

As the population of cancer survivors lives longer and grows, cancer survivorship has become an increasingly recognized subject, and the Institute of Medicine and National Research Council have published a monograph entitled *From Cancer Patient to Cancer Survivor: Lost in Transition.* The monograph proposes a plan that would inform clinicians caring for cancer survivors in complete detail of their previous treatments, complications thereof, signs and symptoms of late effects, and recommended screening and follow-up procedures. Table 125-2 lists long-term treatment effects by cancer type.

OUTLOOK

Clearly, the challenge for the future is to combine chemotherapy, targeted agents, biologic therapies, radiation, and surgery to produce better outcomes with less toxicity, including late effects of therapy. This is easily said but less easily accomplished. As treatment becomes more effective in new patient populations (ovarian, bladder, anal, and laryngeal cancers, for example), we will expect to discover new populations at risk for late effects. These populations will need to be followed carefully, so that such effects are recognized and treated. Cancer survivors represent an underused resource for prevention studies. Childhood cancer survivors, especially, suffer multiple chronic health impairments. The incidence of these late treatment consequences appears to have no plateau with age, throwing in stark relief the necessity of close monitoring and therapies with fewer late consequences of treatment.