ONCOLOGY[1]

I. INTRODUCTION

A. OUTLINE OF HIGHLIGHTED CONDITIONS

Evaluating candidates with a history of tumor or malignancy poses a unique challenge to the examining physician due to the vast diversity of pathological types, stages, and methods of treatment. In addition, oncological conditions are rarely encountered in patrol officer applicants, thereby providing screening physicians with very limited experience in this area. This chapter therefore describes a generic approach to the use of readily-available informational resources to enable a physician to evaluate any candidate, regardless of tumor type or treatment regimen.

B. IMPLICATIONS FOR JOB PERFORMANCE

Tumors and the side-effects of therapy can impair a candidate's ability to perform high exertional tasks that require an exercise capacity of at least 12 METS, such as running and subduing combative arrestees (see Respiratory chapter). Fortunately, most candidates will be in remission and have no evidence of current disability. However, recurrences can threaten the candidate's ability to perform in the immediate future (i.e., 2 years).

II. MEDICAL EXAMINATION AND EVALUATION GUIDELINES

A. GENERAL SCREENING RECOMMENDATIONS

1) History: The physician must thoroughly question candidates who admit to symptoms which are potential early warning signs of tumors. These would include persistent cough or hoarseness, unexplained fevers or weight loss, recent change in bowel or bladder habits, non-healing sores, unusual bleeding or discharge, difficulty in swallowing, and obvious change in a wart or mole.

2) Examination: All candidates should have a physical examination which includes inspection of the skin and mouth, and palpation of lymph nodes and testicles. All female candidates with a family history of breast cancer in a first-degree relative should have a breast examination.

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B. EVALUATION OF A CANDIDATE WITH A HISTORY OF TUMOR OR MALIGNANCY

The physician should obtain medical records regarding the pathological diagnosis, the results of the original staging, treatment, and the last follow-up exam or screening procedure. If the applicant has not had appropriate follow-up testing, it is reasonable to require that it be completed prior to the final evaluation at the candidate's expense.

The physician must assess all of the following:

1) Current disability due to direct damage from the tumor or metastases:

2) Current disability due to fatigue or opportunistic infections:

Assessing work limitations due to these factors is usually not difficult and can be done on the basis of symptoms. In certain cases, the physician should utilize functional testing such as spirometry or exercise testing (see Respiratory System).

3) Current disability due to the effects of medical, surgical, or radiation therapy:

Medical treatment can result in side-effects both during active treatment (Table VI-1) and after treatment has ceased (Table VI-2). Review of medical records and recent laboratory tests from the treating oncologist should be sufficient to detect the majority of these effects. In certain cases, additional testing should be routinely obtained (Table VI-2). Radiation therapy will have the greatest acute effects on the hematological, respiratory, and gastrointestinal systems.

4) Probability of disability in the immediate future:

Fortunately, the vast majority of candidates will be in remission, and have no disability due to the concerns (1-3) listed above. However, disability may occur in the immediate future (i.e., 2 years), due to either of the following:

a) ***Delayed effects from treatment***: While the risk of developing delayed side-effects in patients who are currently asymptomatic is low, it is advisable to require a very short deferral period (no longer than three months) for candidates who will soon complete or have just completed a course of a drug listed in Table VI-2, or radiation therapy. Delayed effects due to the latter are secondary to fibrosis which may occur in the lungs and the heart. Post-radiation applicants should be tested for pulmonary diffusing capacity, and have a echocardiogram or MUGA scan to evaluate their ejection fraction.

TABLE VI-1:
Toxicity of Anticancer Drugs and Hormones (Dose-Limiting Effects are in Bold Type)

Drug	Acute Toxicity
Altretamine	Nausea and vomiting
Aminoglutethimide	Drowsiness; nausea; dizziness; rash
Asparaginase	Nausea and vomiting; fever; chills; headache; hypersensitivity, anaphylaxis; abdominal pain; hyperglycemia leading to coma
BCG	Bladder irritation; nausea and vomiting; fever; sepsis
Bleomycin	Nausea and vomiting; fever; anaphylaxis and other allergic reactions
Busalfan	Nausea and vomiting; rare diarrhea
Carboplatin	Nausea and vomiting
Carmustine (BCNU)	Nausea and vomiting; local phlebitis
Chlorambucil	Seizures; nausea and vomiting
Cisplatin (cis-DDP)	Nausea and vomiting; anaphylactic reactions; fever; hemolytic-uremic syndrome
Cyclophosphamide	Nausea and vomiting; type 1 (anaphylactoid) hypersensitivity; facial burning with IV administration; visual blurring
Cytarabine HCl	Nausea and vomiting; diarrhea; anaphylaxis
Dacarbazine	Nausea and vomiting; diarrhea; anaphylaxis; pain on administration
Dactinomycin	Nausea and vomiting; diarrhea; local reaction and phlebitis; anaphylactoid reaction
Daunorubicin HCl	Nausea and vomiting; diarrhea; red urine (not hematuria); severe local tissue damage and necrosis on extravasation; transient ECG changes; anaphylactoid reaction
Doxorubicin HCl	Nausea and vomiting; red urine (not hematuria); severe local tissue damage and necrosis on extravasation; diarrhea; fever; transient ECG changes; ventricular arrhythmia; anaphylactoid reaction
Estramustine phosphate sodium	Nausea and vomiting; diarrhea
Etoposide (VP16-213)	Nausea and vomiting; diarrhea; fever; hypotension; allergic reactions

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TABLE VI-1 **(Continued)**:
Toxicity of Anticancer Drugs and Hormones (Dose-Limiting Effects are in Bold Type)

Drug	Acute Toxicity
Floxuridine	Nausea and vomiting; diarrhea
Fluorouracil (5-FU)	Nausea and vomiting; diarrhea; hypersensitivity reaction
Flutamide	Nausea; diarrhea
Goserelin	Transient increase in bone pain and ureteral obstruction in patients with metastatic prostate cancer; hot flashes
Hydroxyurea (hydroxy-carbamide)	Nausea and vomiting; allergic reactions to tartrazine dye
Idarubicin	Nausea and vomiting
Ifosfamide	Nausea and vomiting; confusion; nephrotoxicity; metabolic acidosis
Interferon Alfa-2a, Alfa-2b	Fever; chills, myalgias; fatigue; headache; arthralgias; hypotension
Leuprolide acetate (LHRH-releasing factor analogue)	Transient increase in bone pain and ureteral obstruction in patients with metastatic prostate cancer; hot flashes
Levamisole	Nausea and vomiting; diarrhea
Lomustine (CCNU)	Nausea and vomiting
Mechlorethamine HCl (nitrogen mustard)	Nausea and vomiting; local reaction and phlebitis
Melphalan	Mild nausea; hypersensitivity reactions
Mercaptopurine	Nausea and vomiting; diarrhea
Mesna	Nausea and vomiting; diarrhea
Methotrexate (MTX)	Nausea and vomiting; diarrhea; fever; anaphylaxis; hepatic necrosis
Mitomycin	Nausea and vomiting; local reaction; tissue necrosis; fever
Mitotane (o,p'-DDD)	Nausea and vomiting; diarrhea
Mitoxantrone HCl	Blue-green pigment in urine; blue-green sclera; nausea and vomiting; stomatitis

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TABLE VI-1 **(Continued)**:
Toxicity of Anticancer Drugs and Hormones (Dose-Limiting Effects are in Bold Type)

Drug	Acute Toxicity
Octreotide	Nausea; diarrhea; abdominal pain
Plicamycin	Nausea and vomiting; diarrhea; fever
Procarbazine HCl	Nausea and vomiting; CNS depression; disulfiram-like effect with alcohol
Streptozocin	Nausea and vomiting; local pain; chills and fever
Tamoxifen citrate	Nausea and vomiting; hot flashes; transient increased bone or tumor pain; hypercalcemia
Thioguanine	Occasional nausea and vomiting
Thiotepa	Nausea and vomiting; local pain at site of injection
Vinblastine sulfate	Nausea and vomiting; local reaction and phlebitis with extravasation
Vincristine sulfate	Local reaction with extravasation

Note: Cutaneous reactions (sometimes severe), hyperpigmentation, and ocular toxicity have been reported with virtually all nonhormonal anticancer drugs. Reproduced with permission from The Medical Letter, June 2, 1989.

TABLE VI-2:
Recommendations for Supplemental Testing* of Candidates Who are at Risk of Delayed Toxicity from Selected Anticancer Drugs

Drug	Primary Delayed Toxicity	Recommended Supplemental Tests
Bleomycin	Pulmonary fibrosis	CXR**
Busulfan	Pulmonary fibrosis	CXR**
Carmustine	Pulmonary fibrosis	CXR**
Cisplatin	Peripheral neuropathy	Thorough neurological exam
Daunorubicin	Cardiotoxicity	Cardiac stress test
Doxorubicin	Cardiotoxicity	Cardiac stress test
Melphalan	Pulmonary fibrosis	CXR**
Methotrexate	Pulmonary fibrosis	CXR**
	Hepatic toxicity	None
Mitoxantrone	Cardiotoxicity	Cardiac stress test
Vinblastine	Peripheral neuropathy	Thorough neurological exam
Vincristine	Peripheral neuropathy	Thorough neurological exam

*Routine testing of all candidates regardless of history should include spirometry, urinalysis, LFTs and complete CBCs.
**PA Chest radiograph

b) ***Tumor recurrence***: A recurrent tumor leads to recurrent treatment and potential disability. The challenge is to assess whether the cancer is likely to recur in the immediate future (i.e., 2 years), and whether any subsequent treatment would interfere with the ability to perform the essential functions of a peace officer.

To make this assessment, current information on tumor recurrence rates is essential. Potential sources include the following:

- The Surveillance, Epidemiolgy, and End Results (SEER) database. Five-year survival data is presented in Table VI-3, and should be helpful in providing a general overview of prognosis. Stratification by stage is also available from the SEER website (www-seer.ims.nci.nih.gov) for many types of tumors. This is very important for some tumors, but not for others. For example, the five-year survival rate for melanoma with distal metastases is 12% vs. 59% for patients with regional spread only. However, patients with distal spread of testicular cancer still have a 73% five-year survival. In using this data, one should be aware that survival rates are not the same as relapse-free or disease-free rates. Unfortunately, this data is not available from SEER.

- The textbook Cancer: Principles and Practice of Oncology. V.T. DiVita, S. Hellman, and S.A. Rosenberg. Philadelphia: J.B. Lippincott. Expensive but available in medical libraries.

- The medical literature. Summaries are available at several websites including NCI (http://cancernet.nci.nih.gov) and the University of Pennsylvania Cancer Center (http://oncolink.upenn.edu).

If disability is more likely than not in the immediate future, the physician may recommend a deferral of the candidate until this risk abates.

TABLE VI-3: Age-Adjusted SEER
5 - Year Survival Rates

SITE	SURVIVAL % (1989 - 1994)		SITE	SURVIVAL % (1989 - 1994)	
	Males	Females		Males	Females
Oral Cavity & Pharynx	**50**	**60**	**Respiratory System**	**18**	**18**
Lip	95	99	Nose, nasal cavity & middle ear	52	51
Tongue	44	59	Larynx	68	59
Salivary gland	67	79	Lung & bronchus	13	16
Floor of mouth	50	62	Pleura	4	15
Gum & other oral cavity	38	64	Trachea & other respiratory organs	47	46
Nasopharynx	51	52	**Bones & Joints**	**64**	**70**
Tonsil	46	47	**Soft Tissue (including heart)**	**65**	**65**
Oropharynx	27	34	**Skin (ex basal & Squam)**	**55**	**91**
Hypopharynx	28	34	Melanomas of skin Other non-epithelial skin	86 16	91 89
Other oral cavity & pharnyx	22	26	**Multiple myeloma**	**30**	**28**

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TABLE VI-3 **(Continued)**: Age-Adjusted SEER
5 - Year Survival Rates

SITE	SURVIVAL % (1989 - 1994)	
	Males	Females
Digestive System	**42**	**46**
Esophagus	12	12
Stomach	18	25
Small intestine	47	51
Colon & Rectum	62	62
Colon	64	62
Rectum	60	61
Anus, anal canal & anorectum	56	62
Liver & Intrahep:	4	8
Liver	4	9
Intrahep bile duct	3	4
Gallbladder	3	15
Other biliary	21	16
Pancreas	4	4
Retroperitoneum	52	45
Peritoneum, omentum & mesentery	20	31
Other digestive system	4	2
Male Genital System	**93**	**-**
Prostate	93	-
Testes	95	-
Penis	65	-
Other male genital system	80	-
Female Genital System	**-**	**70**
Cervix uteri	-	70
Corpus uteri	-	85
Uterus, NOS	-	25
Ovary	-	50
Vagina	-	50
Vulva	-	77
Other female genital system	-	61

SITE	SURVIVAL % (1989 - 1994)	
	Males	Females
Breast	**85**	**85**
Urinary System	**78**	**67**
Urinary bladder	85	74
Kidney & renal pelvis	62	60
Ureter	64	57
Other urinary system	72	51
Eye & Orbit	**79**	**78**
Brain & Nervous System	**31**	**30**
Brain	28	27
Cranial nerves & other nervous system	66	65
Endocrine System	**86**	**94**
Thyroid	92	96
Other endocrine & thymus	60	60
Lymphomas	**53**	**62**
Hodgkin's disease	80	95
Non-Hodgkin's & lymphomas	47	56
Leukemias	**43**	**42**
Lymphocytic:	65	66
Acute lymphocytic	57	60
Chronic lymphocytic	71	71
Other lymphocytic	36	36
Myeloid:	20	22
Acute myeloid	13	15
Chronic myeloid	30	35
Other myeloid	28	31
Monocytic:	18	16
Acute monocytic	19	13
Chronic monocytic	-	-
Other monocytic	-	-
Other:	40	25
Other acute	11	12
Other chronic	-	-
Aleukemic, subleuk & MOS	57	35
Ill-defined & Unspecified	**13**	**12**

REFERENCES

DiVita, V.T., Hellman, S., and Rosenberg, S.A. 2001. Cancer: Principles and practice of oncology, 6th ed. Philadelphia: Lippincott, Williams & Wilkins.

National Cancer Institute (NCI) - website: (http://cancernet.nci.nih.gov).

Surveillance, Epidemiolgy, and End Results (SEER) - website: (www-seer.ims.nci.nih.gov).

University of Pennsylvania Cancer Center - website: (http://oncolink.upenn.edu).