



2.14.1 Introduction

Malignancy poses a threat to flight safety for a number of reasons including:

- Direct effect(s) of the primary tumour
- Effect(s) of secondary spread
- Effect(s) of treatment modalities
- Psychological effect
- Cachexia
- Endocrine or Biochemical disturbances.

Any pilot or Air Traffic Controller (ATC) diagnosed with a malignancy must refrain from aviation or air traffic control duties until fitness to return to such duties is assessed by CASA.

Automatic return to flying or controlling status should not be assumed. Some pilots and ATCs may be medically certificated following diagnosis and adequate treatment of their malignancy, provided there is an adequate program of ongoing surveillance. Others will require a lengthy period prior to certification due to ongoing symptoms or the risk of recurrence of the primary or metastatic spread. In some circumstances re-certification will not be approved.

Prior to medical certification on a pilot or ATC suffering from cancer, CASA must be sure that an applicant:

- Has recovered from the primary treatment
- Has no sign of residual tumour, of tumour spread or of secondary manifestations of tumour
- Is psychologically stable enough to undertake aviation duties.

Re-certification will depend on the likelihood and type of recurrent disease and the risk that it will adversely affect flight safety.

2.14.2 Principles of Aeromedical Certification of Pilots/ATCs with Malignancy

When considering the aeromedical risk (and therefore the risk to aviation safety) posed by a pilot or ATC suffering from a malignancy, CASA will evaluate:

- Cancer specific issues such as:
 - The type of cancer (tissue and histological diagnosis)
 - Likelihood of recurrence
 - Site of recurrence
 - Presence of any para-neoplastic syndromes
 - Potential for a recurrence to cause overt or subtle in-flight incapacitation.
- Issues related to the treatment of the cancer.

2.14.3 Cancer Specific Issues

Histological variants of a particular tissue cancer may behave biologically differently from other variants. Therefore, when assessing the aeromedical risk of a pilot or ATC with a malignancy, accurate tissue diagnosis of the malignancy is essential.

Complications of the Malignancy

Potential complications of malignancy will affect CASA's assessment of fitness for aviation related duties. Malignancy may lead to pain, wasting, neuropathy, nausea, anorexia, seizures, hypercalcaemia, hyperuricaemia, viscus obstruction, and organ failure. Some cancers have para-neoplastic syndromes associated with their presence. These syndromes result from excessive or ectopic hormones synthesized by a tumour, immune complexes, ectopic receptor production, or release of physiologically active compounds and may manifest in a variety of ways. Most para-neoplastic syndromes have serious implications for aviation safety.

Likelihood of Recurrence

Figure 1 depicts the overall survival curve for individuals diagnosed with a theoretical malignancy. For most cancer types, annual recurrence rates can be calculated from survival curves. (As cure following recurrence is rare, overall survival approximates recurrence).

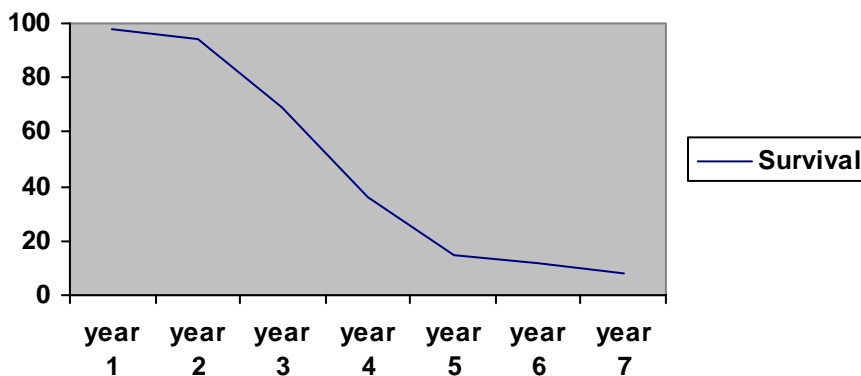


Figure 1: Notional Cancer Survival Curve

Staging

Recurrence rates are greatly influenced by the stage of disease when primary treatment occurred. Many cancers are staged using a TNM (Tumour, Node, Metastasis) classification. Figure 2 depicts the variation in survival rates for a theoretical cancer according to the degree of spread evident at diagnosis.

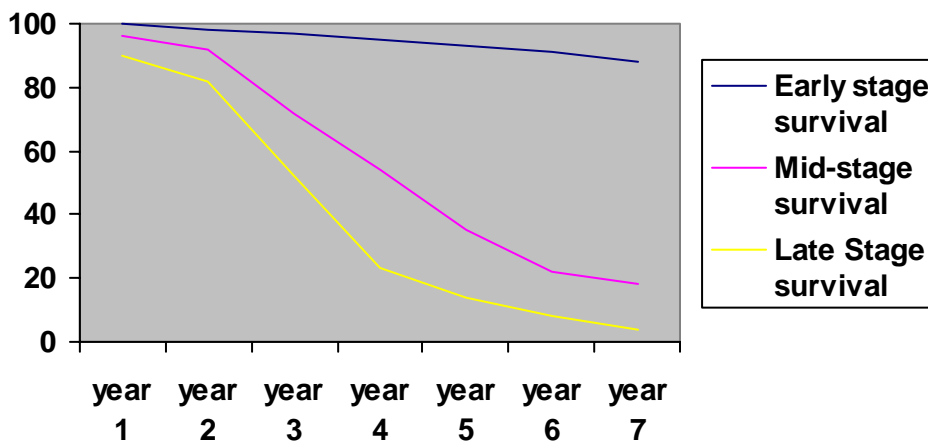


Figure 2: Notional survival rates from a cancer according to stage at diagnosis

Tumour Marker

Tumours may synthesize proteins that produce no clinical symptoms, eg, β -human chorionic gonadotropin, α -fetoprotein, carcinoembryonic antigen, CA 125, and CA 153. These protein products may be used as tumour markers in the serial evaluation of patients for determining disease recurrence or response to therapy. These markers may assist CASA in assessing the suitability of a pilot or ATC to return to aviation duty, as they can often be valuable in tracking response to treatment or recurrence of disease.



Site of recurrence

Each tumour has a characteristic pattern of recurrence. Thus for a theoretical tumour, metastases might occur according to the distribution indicated in [Table 1](#).

Table 1: Distribution of metastasis for a theoretical cancer

Site	Incidence (%)
Local and lymph nodes	60
Liver	20
Lung	10
Bone	5
Bone marrow	3
Brain	2

Risk of particular metastasis causing incapacitation

Several assumptions are made when assessing the risk of a particular metastasis causing incapacitation (either subtle or overt). For a theoretical cancer, recurrence in a regional lymph node carries a relatively small risk of incapacitation. On the other hand, brain metastasis has a near-100% potential for incapacitation (whether sudden due to a fit or bleed, or subtle as a result of pressure effects or headache etc). Thus the incapacitation risk weighting for a theoretical cancer may be as depicted in [Table 2](#).

Table 2: Notional risk of incapacitation from metastasis

Site	Incapacitation weighting (%)
Local and lymph nodes	1
Liver	5
Lung	5
Bone	5
Bone marrow	20
Brain	100

Total risk of incapacitation

From the parameters defined above, a total risk of incapacitation can be calculated:

- Recurrence rate per year for the particular stage of the malignancy
- Frequency of metastatic disease in a particular organ
- Risk that metastasis in that organ will cause incapacitation.



Thus for an early stage cancer, the result of a calculation of the risk of incapacitation from brain metastasis may be:

$$3\% \times 3\% \times 100\% = 0.09\% \text{ for the first year}$$

For a theoretical late stage cancer from bone marrow metastases, the risk may be:

$$15\% \times 3\% \times 100\% = 0.45\% \text{ for the first year.}$$

In order to determine the overall risk, it is necessary to add the risks from all the possible recurrence sites.

2.14.4 Treatment Related Issues

In general, cancer is treated in one (or a combination) of the following ways:

- **Surgery** is the commonest treatment for malignant disease, and often is the only treatment. Aeromedical certification after surgery for cancer depends on the extent and success of the operation. Complications of surgery are considered on their merits, taking into account the underlying medical condition and the overall health of the affected individual.
- **Radiotherapy** is usually delivered as an intensive course. The aim may be curative, for example where an isolated group of lymph nodes have been shown to contain malignant cells, or as adjuvant therapy where lymph nodes are assumed to contain metastatic tumour. During the active part of radiotherapy treatment, pilots and ATCs will be assessed as temporarily unfit for duty. Following radiotherapy many patients suffer non-specific systemic effects, such as tiredness, malaise and nausea, which makes it inappropriate for them to partake in aviation activities at least until such effects have resolved. Occasionally there are long-term effects after radiotherapy, such as scarring, which may preclude fitness for aviation duties.
- **Chemotherapy**. During acute chemotherapy treatment (whether curative or adjuvant), pilots and ATCs will be assessed as temporarily unfit, as all chemotherapy drugs are cytotoxic, and frequently have a significant effect on normal tissue, such as rapidly dividing cells in the bone marrow. Once active chemotherapy has ceased and side effects have resolved, aeromedical certification may be possible and will be considered on a case-by-case basis. In some cases low doses of chemotherapy agents may be prescribed as maintenance therapy. Where CASA considers that such medications do not reduce aviation safety, aeromedical certification may be considered, also on a case-by-case basis.

- **Hormonal therapy.** Endocrine therapy is used as part of the treatment of some cancers (such as hormone and anti-hormone treatment following breast and prostate cancer). Pilots and ATCs may be returned to flying or controlling if there are no side effects from their hormonal therapy. In all cases, the decision to return to duty while on cancer chemotherapy will be made by CASA Aviation Medicine Section (AMS), on a case-by-case basis, when absence of adverse disease effects is confirmed.
- **Complementary or alternative medicine.** These modalities are commonly used by patients in the treatment of malignancy, particularly where the primary treatment modalities have failed to produce a cure. Where such treatments are used in the presence of continued active disease, the applicant is assessed as unfit. Where the treatment is used to prevent onset of malignancy or recurrence, the treatment will be considered on a case-by-case basis, with regard to the individual's overall health and the potential effect of the treatment. Herbal medications are discussed in Section [2.13 Medication](#). All such cases should be referred to CASA AMS for consideration.

2.14.5 Specific Malignancies

The commonest forms of malignant disease in the Australian pilot and ATC population are (in order):

- Prostate cancer
- Malignant melanoma
- Bowel (colon) cancer
- Non-Hodgkin's lymphoma
- Cancer of the testis (multiple types)
- Bladder cancer
- Kidney cancer
- Cancer of the rectum/anus
- Breast cancer
- Hodgkin's lymphoma.

The following discussion relates to the five most commonly encountered malignancies in the aviation population in Australia, as well as Hodgkin's Disease. Information on re-certification following diagnosis with such malignancies is to be taken as guidance and indicative only. CASA will address each case individually and make a decision based on its unique issues. In general, DAMEs and certificate applicants may anticipate an outcome along the lines described as a way to plan for possible grounding periods. Applicants should endeavour to provide specialist evidence and opinion to refute the guidance below should there be a request to return to multi-crew or solo flying or controlling prior to the times indicated.

Prostate Cancer

Adenocarcinoma of the prostate is the commonest malignancy in men aged 50 years or more in Australia, and the incidence increases with each decade of life. Hormonal influences undoubtedly play a role in the aetiology of adenocarcinoma. Grading is based on architectural patterns and is commonly reported as the Gleason score: the primary (most prevalent) grade (1-5) plus the secondary (next most prevalent) grade (1-5); thus, it ranges from 2 (very well differentiated) to 10 (very poorly differentiated). Staging is described in [Table 3](#).

Table 3: Staging of prostatic cancer

Staging System		Characteristics of Tumour
Whitmore	AJCC/TNM	
A	T1	Is clinically inappropriate by palpation or imaging
	T1a	Is an incidental finding in $\leq 5\%$ of resected tissue
	T1b	Is an incidental finding in $> 5\%$ of resected tissue
	T1c	Is identified by needle biopsy performed for an elevated prostate-specific antigen level
B	T2	Is palpable or reliably visible on imaging; is confined to prostate
	T2a	Involves one lobe
	T2b	Involves both lobes
C	T3	Extends through the prostatic capsule
	T3a	Has extracapsular extension (unilateral or bilateral)
	T3b	Invades seminal vesicles
D	T4	Is fixed or invades adjacent structures

AJCC = American Joint Committee on Cancer
 TNM = tumour node metastasis

Symptoms, Signs, and Diagnosis

Prostatic cancer is usually slowly progressive and may cause no symptoms. In late disease, symptoms of bladder outlet obstruction, ureteral obstruction, and hematuria may appear. Metastases to the pelvis, ribs, and vertebral bodies may cause bone pain. Carcinoma is often diagnosed incidentally when malignant changes are found in the tissue removed during surgery for suspected benign prostatic enlargement.

Elevated serum acid phosphatase or Roy test (an enzymatic method) correlates well with the presence of metastatic prostate cancer, particularly in lymph nodes. Although acid phosphatase and Prostatic Specific Antigen (PSA) levels decline after treatment and rise with recurrence, PSA is the more sensitive marker for monitoring cancer progression and response to therapy. However, because serum PSA is moderately elevated in 30 to 50% of patients with benign prostatic hyperplasia (depending on prostate size and degree of obstruction) and in 25 to 92% of those with prostate cancer (depending on tumour volume), its role in early detection and staging is unclear. Significantly elevated PSA levels suggest extracapsular extension of tumour or metastases.



Prognosis and Treatment

Long-term local control—even cure—is possible. However, the potential for cure, even in patients with clinically localized cancer, depends on factors such as grade, stage, and pretreatment PSA level. For patients with low-grade, organ-confined tumours, survival is virtually identical to that for age-matched controls without prostate cancer.

Most patients elect to undergo definitive therapy with radical prostatectomy or radiotherapy. Radical prostatectomy is probably optimal for younger patients with longer life expectancy; they have the lowest risk of urinary incontinence. Radiotherapy may offer comparable results, especially in patients with low pretreatment PSA levels.

An asymptomatic patient with a locally advanced tumour or metastases may benefit from hormonal therapy with or without adjuvant radiotherapy. Hormonal therapy rarely uses exogenous estrogens, which pose an increased risk of cardiovascular and thromboembolic complications.

Medical Certification

Cancer of the prostate has a generally good prognosis, and tends to metastasise locally or to bone. Once primary treatment has been completed, certification will be possible where:

- There is no evidence of metastatic spread
- PSA has returned to normal
- There are no significant consequences of treatment, such as incontinence.

Should there be metastatic spread which has been controlled and PSA has returned to less than 10, certification will also be considered. Certification will be for no more than 12 months. Each CASA medical examination and report must be accompanied by a progress report from a urologist or oncologist, and a recent PSA level. If the applicant shows no signs of recurrence after three years from initial diagnosis, no further follow-up is required. Where there is metastatic spread surveillance will likely be lifelong. Provided no other medical conditions preclude it, there can be a return to regular certification procedures for age and Class.

Malignant Melanoma

Malignant melanoma is the second commonest malignancy in the Australian aircrew and ATC population. The incidence is rising. Sun exposure is a risk, as is family history and the occurrence of lentigo maligna, large congenital melanocytic naevus, and the dysplastic naevus syndrome.

About 40 to 50% of malignant melanomas develop from pigmented moles. Almost all of the rest arise from melanocytes in normal skin. Signs of malignant transformation should be carefully sought: change in size; change in colour, especially spread of red, white, and blue pigmentation to surrounding normal skin; change in surface characteristics, consistency, or shape; and signs of inflammation in surrounding skin, with possible bleeding, ulceration, itching, or pain.



Malignant melanomas vary in size, shape, and colour (usually pigmented) and in their propensity to invade and metastasize. This neoplasm may spread rapidly, causing death within months of its recognition, yet the 5-year cure rate of early, very superficial lesions is nearly 100%. Cure depends on early diagnosis and early treatment. The major types of malignant melanoma are:

- Lentigo maligna melanoma
- Superficial spreading melanoma: accounts for 2/3 of malignant melanomas
- Nodular melanoma: constitutes 10 to 15% of malignant melanomas.

Prognosis and Treatment

Two classification systems are useful for evaluating melanomas:

- Melanoma thickness as measured from the granular layer of the epidermis to the greatest depth of tumour invasion, as described by Breslow.
- Anatomic level of invasion, as described by Clark. In Clark's classification, level I is confined to epidermis; level II extends into papillary dermis; level III extends further into papillary dermis, with expansion of this layer; level IV extends into reticular dermis; and level V extends into subcutaneous fat.

Increased Breslow thickness and deeper invasion (Clark level) correlate with poorer prognosis. The clinical type of tumour is less important to survival than the thickness of the tumour at the time of diagnosis.

Metastatic spread of melanoma occurs both via lymphatics and blood vessels. Local spread results in formation of nearby satellite papules or nodules that may or may not be pigmented. Direct metastasis to skin or internal organs may occur, and occasionally metastatic nodules or enlarged lymph nodes are discovered before the primary lesion is identified. Melanomas arising from mucous membranes have a very poor prognosis, although they often seem quite limited when discovered.

Treatment is by surgical excision. Although the width of margins is debated, most experts agree that a 1-cm lateral tumour-free margin is adequate for lesions <1 mm thick. Thicker lesions may deserve more radical surgery and sentinel node biopsy.

Thick malignant melanomas and regional or distant metastasis may be treated with chemotherapy. Prognosis is poor.



Table 4: Five-year survival for malignant melanoma

Tumour Thickness (mm) *	5-Year Survival (%)
< 0.76	98 - 100
0.76 - 1.5	90 - 94
1.51 – 2.25	83 – 84
2.26 – 3.0	72 – 77
> 3.0	46

* Tumour thickness is very difficult to assess if histological signs of regression are present.

Aeromedical Certification

Following diagnosis of a malignant melanoma, CASA will not certificate a pilot or ATC for the first 12 months because of the risk of spread to organs such as the brain, lungs or bone. The associated risk of incapacitation is significant. In some circumstances where the prognosis is extremely positive, certification prior to 12 months may be considered.

Class 1 and 3: In the absence of recurrence, CASA will usually approve Class 1 and 3 certification as follows:

Table 5: Post-malignant melanoma certification (Class 1 and 3)

Tumour thickness	Certification	Period post-diagnosis
< 0.76 mm	Solo	12 months
0.76 – 1.49 mm	Multicrew	12 months
	Solo	24 months
1.5 – 2.24 mm	Multicrew	12 months
	Solo	36 months
2.25 – 3.0 mm	Multicrew	24 months
	Solo	48 months
> 3.0 mm	Multicrew	24 months
	Solo	60 months



Class 2: In the absence of recurrence, CASA will usually approve Class 2 certification as follows:

Table 6: Post-malignant melanoma certification (Class 2)

Tumour thickness	Certification	Period post-diagnosis
< 0.76 mm	Solo	12 months
0.76 – 1.49 mm	Solo	12 months
1.5 – 2.24 mm	Solo	12 months
2.25 – 3.0 mm	As or with co-pilot	12 months
	Solo	24 months
> 3.0 mm	As or with co-pilot	12 months
	Solo	36 months

Certification will be for no more than 12 months, and renewal medical examinations and reports must be accompanied by a progress report from the treating dermatologist or oncologist. These reports will be required for at least 3 years following return to unrestricted duties.

Colorectal (Bowel) Cancer

In Western countries, cancers of the colon and rectum account for more new cases of cancer per year than cancer of any other anatomical site except the lung. Colorectal cancer is the most frequent cause of death from visceral malignancies that affect both sexes. The incidence of this condition begins to rise at age 40 and peaks at age 60 to 75 years. Colorectal cancer spreads by direct extension through the bowel wall, haematogenous metastasis, regional lymph node metastasis, perineural spread, and intraluminal metastasis.

Symptoms, Signs, and Diagnosis

Adenocarcinoma of the colon and rectum grows slowly, and a long interval elapses before it is large enough to produce symptoms. Early diagnosis depends on routine examination. Symptoms depend on the lesion's location, type, extent, and complications. In cancer of the rectum, the commonest presenting symptom is bleeding with defecation. Whenever rectal bleeding occurs, even with obvious haemorrhoids or known diverticular disease, coexisting cancer must be excluded. Simple, inexpensive testing of the stool for occult blood is advised as part of both screening and high-risk surveillance programs.

Elevated serum carcinoembryonic antigen (CEA) is not specifically associated with colorectal cancer, but levels are high in 70% of affected patients. If CEA is high preoperatively, and low after removal of a colon tumour, monitoring CEA may help to detect recurrence.



Treatment and Prognosis

Primary treatment consists of wide surgical resection of the colon cancer and regional lymphatic drainage. The choice of operation for rectal cancer depends on the tumour's distance from the anus and gross extent. Abdominoperineal resection of the rectum requires a permanent sigmoid colostomy. Surgical cure is possible in 70% of patients. The best 5-yr survival rate for cancer limited to the mucosa approaches 90% (stage I, Dukes' A); with penetration of the muscularis propria, 80% (stage II, Dukes' B); with positive lymph nodes, 30% (stage III, Dukes' C).

Medical Certification

Issues dealing with colostomy and ileostomy are found in Section [2.9 Gastroenterology](#).

Following diagnosis of a bowel cancer, CASA will not usually certificate a pilot or ATC for the first 12 months because of the risk of spread to organs such as the brain, lungs or bone and the associated risk of incapacitation is significant. CASA will require the following information when considering the fitness of a pilot or ATC to return to aviation-related duties following the diagnosis of colorectal cancer: an annual report from the treating gastroenterologist and/or oncologist, including tissue diagnosis, staging and CEA level, for at least 5 years post-diagnosis.

In the absence of recurrence, CASA will usually approve certification as follows:

Stage I

Class 1 and 3	Post-treatment period
As or with co-pilot/no solo controlling	6 months
Solo	24 months
Class 2	
Solo	6 months

Stage II

Class 1 and 3	Post-treatment period
As or with co-pilot/no solo controlling	12 months
Solo	36 months
Class 2	
Solo	12 months



Stage III

Class 1 and 3	Post-treatment period
As or with co-pilot/no solo controlling	24 months
Solo	48months
Class 2	
As or with co-pilot	12 months
Solo	24 months

Non-Hodgkin's Lymphoma

Non-Hodgkin's Lymphoma is a malignant monoclonal proliferation of lymphoid cells in sites within the immune system, including lymph nodes, bone marrow, spleen, liver, and gastrointestinal tract. Pathological classification of non-Hodgkin's lymphomas (NHL) is evolving, reflecting new insights into the cells of origin and the biological bases of these heterogeneous diseases. The course of NHL varies from indolent and initially well tolerated to rapidly fatal.

Incidence and Aetiology

NHL occurs more often than Hodgkin's disease. Its cause is unknown, although, as with the leukaemias, substantial experimental evidence suggests a viral cause for some lymphomas. Primary CNS involvement and disseminated disease occur. In about 30% of cases, the lymphomas are preceded by generalized lymphadenopathy.

Pathology

The Working Formulation classifies NHL into prognostic categories having therapeutic implications as follows:

- **Low-grade lymphomas** (38%): Diffuse, small lymphocytic; follicular, small-cleaved cell; follicular mixed, small and large cell.
- **Intermediate-grade lymphomas** (40%): Follicular large cell; diffuse, small-cleaved cell; diffuse mixed, small and large cell; diffuse large cell.
- **High-grade lymphomas** (20%): Immunoblastic lymphoma; lymphoblastic lymphoma; small non-cleaved cell lymphoma (Burkitt's and non-Burkitt's types).
- **Miscellaneous lymphomas** (2%): Composite lymphomas; mycosis fungoides; true histiocytic; other, and unclassifiable types.



Symptoms and Signs

Although various clinical manifestations of NHL occur, many patients present with asymptomatic peripheral lymphadenopathy. Enlarged lymph nodes are rubbery and discrete and later become matted. Local disease is apparent in some patients, but most have multiple areas of involvement. Anaemia is initially present in about 33% of patients and eventually develops in most.

Staging

Localised NHL does occur, but the disease is disseminated when first recognized in about 90% of follicular lymphomas and 70% of diffuse lymphomas. The final staging of NHL is similar to that of Hodgkin's disease; however, it is more often based on clinical than pathological findings.

Table 7: Ann Arbor Staging of Hodgkin's Disease and Non-Hodgkin's Lymphoma

Stage *	Criteria
I	In one lymph node only
II	In two or more lymph nodes on the same side of the diaphragm
III	In the lymph nodes, spleen, or both and on both sides of the diaphragm
1	Above the renal vessels (eg, spleen; splenic, hilar, coeliac and portal nodes)
2	In the lower abdomen (periaortic, pelvic, or inguinal nodes)
IV	Extranodal involvement (eg, bone marrow, lung, liver)

*Subclassification E indicates extranodal involvement adjacent to an involved lymph node (eg, disease of mediastinal nodes and hilar adenopathy with adjacent lung infiltration is classified as stage IIE). Stages can be further classified by A to indicate the absence; or B to indicate the presence of constitutional symptoms (weight loss, fever, or night sweats). B symptoms generally occur with stages III and IV (20 to 30% of patients).

Initially, constitutional symptoms tend to be less common in NHL than in Hodgkin's disease and do not usually alter prognosis. Organ infiltration is more widespread in NHL, and the bone marrow and peripheral blood may be involved.

Prognosis and Treatment

The histopathology, stage of disease, and results of surface marker studies significantly influence the prognosis and response to treatment. Patients with T-cell lymphomas generally have a worse prognosis than those with B-cell types. Other factors that adversely affect prognosis are poor performance status, age >60 years, elevated LDH level, bulky tumour masses (diameter >10 cm), and more than two extranodal sites of disease.

A prognostic index for diffuse mixed, diffuse large cell, and immunoblastic lymphomas has been reported. The International Prognostic Index (IPI) considers five categories: age, performance status, LDH level, number of extranodal sites, and stage. Prognostic groups of low, low intermediate, high intermediate, and high risk may be defined.



Table 8: Outcome According to Risk Group as Defined by the International Prognostic Index

Risk Group	Risk Factors (n)	Patients * (%)	Complete Response (%)	2-Yr Relapse-Free Survival (%)	5-Yr Relapse-Free Survival (%)	2-Yr Survival (%)	5-Yr Survival (%)
Low	0 or 1	35	87	79	70	84	73
Low - intermediate	2	27	67	66	50	66	51
High - intermediate	3	22	55	59	49	54	43
High	4 or 5	16	44	58	40	34	26

* Patients total 2031, including 1385 in the training sample and 646 in the validation sample. Adapted from The International Non-Hodgkin's Lymphoma Prognostic Factors Project: "A predictive model for aggressive non-Hodgkin's lymphoma." *N Engl J Med* 329(14):987-994, 1997.

A cure may be expected in 30 to 50% of affected patients with intermediate- and high-grade lymphomas undergoing myeloablative therapy. In low-grade lymphomas, it remains uncertain whether cure may be obtained with transplantation, although their survival rate is better than that of patients receiving secondary palliative therapy alone.

Medical Certification

Without a complete remission, return to aviation duties will not usually be considered. Once in remission, certification will usually be conducted on a case-by-case basis, using Table 9 (see next page) as a guide. The high rate of late recurrence limits the likelihood of an unrestricted Class 1 or Class 3 certification.

Table 9: Post-remission certification

Risk Group	Class 1 & 3 solo	Class 1 & 3 multi-crew/no solo controlling	Class 2 solo	Class 2 as or with co-pilot
Low	4 years	2 years	2 years	1 year
Low - intermediate	5 years	2 years	3 years	1 year
High - intermediate	Certification unlikely	2 years	4 years	2 years
High	Certification unlikely	2 years	5 years	3 years

Timing is after a complete remission has been obtained.

Applications for renewal of a medical certificate must be accompanied by a progress report from the treating haematologist or oncologists detailing treatment, prognosis and current health. Certification will be for a maximum of 12 months until at least 5 years post-re-certification, and at least 3 years following return to unrestricted duties.



Hodgkin's Disease

Hodgkin's Disease is a localised or disseminated malignant proliferation of tumour cells arising from the lymphoreticular system, primarily involving lymph node tissue and bone marrow.

Incidence and Aetiology

Hodgkin's disease has a bimodal age distribution that peaks at ages 15 to 34 and after age 60. However, the second peak may be an artefact of inaccurate diagnosis, because most cases diagnosed after age 60 are intermediate-grade non-Hodgkin's lymphomas.

Pathology

Diagnosis depends on identification of Reed-Sternberg cells (large binucleated cells) in lymph nodes or at other sites.

Table 10: Histopathological Subtypes of Hodgkin's Disease

Type	Appearance	Incidence	Progression
Lymphocyte predominant	Few Reed-Sternberg cells and many lymphocytes	3%	Relatively slow or indolent
Nodular sclerosis	Dense fibrous tissue surrounds nodules of Hodgkin's tissue	67%	Intermediate or moderately progressive; relatively slow or indolent (occasionally)
Mixed cellularity	A moderate number of Reed-Sternberg cells with a mixed background infiltrate	25%	Intermediate or moderately progressive; aggressive
Lymphocyte-depleted	Numerous Reed-Sternberg cells and extensive fibrosis	5%	Aggressive

Symptoms and Signs

Symptoms and signs primarily relate to the site, amount, and extent of nodal mass involvement. Most patients present with cervical and mediastinal adenopathy and without systemic complaints. Other manifestations develop as the disease spreads through the reticuloendothelial system, generally among contiguous sites. The rate of progression varies according to histopathological subtype.

Diagnosis

Hodgkin's disease can be definitively diagnosed by lymph node biopsy that reveals Reed-Sternberg cells in a characteristic histological setting. Hodgkin's disease may be difficult to differentiate from lymphadenopathy caused by infectious mononucleosis, toxoplasmosis, cytomegalovirus, NHL, or leukaemia.



Staging

Radiotherapy, chemotherapy, or a combination of both is potentially curative, but the extent or stage of disease must first be determined. The Ann Arbor staging system (see [Non-Hodgkin's Lymphoma](#)) is commonly used.

Treatment

Chemotherapy or radiotherapy regimens cure most patients.

- **Stage I and IIA disease** can be treated with radiotherapy. Such treatment cures about 80% of patients. Cure refers to being disease-free at 5 years post-therapy, after which relapse is very rare.
- For **stage IIIA1 disease**, total nodal irradiation results in an overall survival of 85 to 90%, with disease-free survival of 65 to 75% at 5 years.
- For **stage IIIA2 disease**, combination chemotherapy is generally used with or without radiotherapy of bulky nodal sites. Cure rates of 75 to 80% have been achieved.
- Because radiotherapy alone does not cure **stage IIIB disease**, combination chemotherapy alone or in conjunction with radiotherapy is required. Survival ranges from 70 to 80% (at 5 years).
- For **stage IVA and B disease**, combination chemotherapy has produced a complete remission in 70 to 80% of patients, with >50% remaining disease-free at 10 to 15 years. Patients who fail to achieve complete remission or who relapse within 6 to 12 months have a poor prognosis.

Medical Certification

CASA will not usually consider certification until at least 12 months following successful treatment. "Successful treatment" requires that the disease be in complete remission. Table 11 (below) provides guidance on the likely time before CASA will consider certification, following diagnosis, assuming that there are no other significant health issues, no side effects from the treatment and ongoing complete remission or "cure" has been effected. All renewal medical examinations and reports must be accompanied by a progress report from the treating haematologist or oncologist.

Table 11: Likely certification timings

Stage	Class 1 & 3 solo	Class 1 & 3 multi-crew/no solo controlling	Class 2 solo	Class 2 as or with co-pilot
I and IIA	1 year	6 months	1 year	6 months
IIIA1	2 years	1 year	2 years	6 months
IIIA2	3 years	2 years	2 years	1 year
IIIB and IV	4 years	2 years	3 years	1 year



Testicular Cancer

Testicular tumours account for most solid tumours in males aged less than 30 years. Malignant testicular tumours arise from the primordial germ cell and differentiate to reveal seminoma, teratoma, embryonal carcinoma, endodermal sinus tumour (yolk sac tumour), and choriocarcinoma.

Symptoms, Signs, and Diagnosis

The usual presenting sign is a scrotal mass, sometimes associated with pain. Many patients discover the mass in association with minor trauma. Haemorrhage into the tumour may produce local pain and tenderness. Any firm mass in the testis is cause for immediate clinical suspicion of testicular tumour. Diagnostic studies should include radioimmunoassays for α -fetoprotein and β -human chorionic gonadotropin. These markers, when elevated, indicate the presence of tumour; they are also valuable in follow-up of patients with proven testicular tumours, especially the non-seminomatous types.

Prognosis and Treatment

Prognosis depends on the histology and extent of the tumour. Survival rates are >95% at 5 years for seminomas and non-seminomas localized to the testis or low-volume metastases in the retroperitoneum. The 5-year survival rate for extensive retroperitoneal metastases or pulmonary or other visceral metastases is poorer and varies with site, volume, and histology of the metastases.

Radical (inguinal) orchidectomy, the cornerstone of treatment, provides important histopathological information for planning further therapy. These parameters can accurately predict the risk of occult lymph node metastases; so low-risk patients with normal x-rays and biomarkers may be candidates for surveillance protocols, especially patients with non-seminomatous germ cell tumours rather than seminomas. Otherwise, standard treatment for seminoma is irradiation after unilateral orchidectomy. For non-seminomatous germ cell tumours, standard treatment is retroperitoneal lymph node dissection.

Medical Certification

Stage 1 (non-metastatic disease):

- *Teratoma with orchidectomy only.* Following recovery from the surgery, unrestricted Class 1, 2 or 3 is usual. For the first 24 months, certification is for 6 months at a time. Each medical is to be accompanied by a report from urologist or oncologist, along with tumour marker levels. Tumour markers will usually rise before any anatomical disease is identifiable. After two years without recurrence, this can increase to 12 monthly certification, until 5 years post-diagnosis.



- *Seminoma with orchidectomy only.* There is a 15% relapse rate. This is usually monitored by serial CT or MRI scans. Unrestricted Class 1 or 3 certification will be delayed for 24 months post-surgery. Restricted Class 1 and 3 and unrestricted Class 2 is possible from recovery after surgery. Certification will be for 6 months for the first two years, then annual until 5 years post-diagnosis.
- *Seminoma with orchidectomy and radiotherapy.* As the cure rate is greater than 99%, unrestricted Class 1, 2 and 3 certification is possible as soon as the individual has recovered from the primary treatment. Certification again will be for 6 months for the first 2 years, then annual, and the medical must be accompanied by a progress report from the treating urologist or oncologist.

Stage II/III (local metastatic disease): The prognosis remains good compared with most other malignancies.

Table 12: Stage II/III (local metastatic disease)

Class 1/3 multi-crew/no solo controlling	Following recovery from primary treatment and disease free
Class 1/3 solo	12 months following successful treatment
Class 2 as or with co-pilot	Following recovery from primary treatment and disease free
Class 2 solo	6 months following successful treatment

Renewal medical examinations and reports must be accompanied by a progress report from the treating specialist.

Stage IV (disseminated disease): Although 5-year survival is around 60-70%, this outcome is usually achieved only by prolonged chemotherapy. While chemotherapy is required, there will be no certification.

Table 13: Stage IV (disseminated disease)

Class 1/3 multi-crew/no solo controlling	24 months following successful treatment
Class 1/3 solo	Certification unlikely
Class 2 as or with co-pilot	12 months after last treatment and continued disease free
Class 2 solo	24 months following successful treatment

Renewal medical examinations and reports must be accompanied by a progress report from the treating specialist.

Other Malignancies

This section is not intended to provide detailed advice for all possible malignancies. Other malignancies may be discussed in the relevant organ system section of this *Handbook*. Otherwise, the guiding principles outlined above should be used. Where doubt exists, discussion with, or referral to, CASA Aviation Medicine Section should be undertaken immediately.

Designated Aviation Medical Examiner's Handbook

2. Medical Aspects

2.14 Malignancy

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