

2.4.1 Introduction

This section details the assessment of pilots, other aircrew members and air traffic controllers who suffer or who may suffer from endocrine disease or from metabolic disorders.

The aim of the endocrine assessment within the aeromedical examination is to ensure that applicants do not suffer from endocrine or metabolic conditions which place them at an increased risk of incapacitation or which may produce a decrement in physiological or psychological function sufficient to jeopardise the safety of air navigation. In conducting the aeromedical examination, the DAME will recognise that an individual who holds an unrestricted medical certificate must be capable of performing all the activities and of exercising all the privileges that are permitted under the class of licence held. Such activities may include flight (either as a private or professional pilot):

- For prolonged duration, often as part of a shift roster
- Subject to disrupted sleep and time zone changes
- In a variety of weather conditions
- Subject to extremes of temperature, humidity, atmospheric pressure, noise, vibration and acceleration
- Reliant on support services (including provision of food and water) of varying quality and reliability
- With little or no medical/health support
- With the potential for an emergency/mass casualty/survival situation to occur with little or no warning

A number of these stressors may also affect Air Traffic Controllers.

2.4.2 The Endocrine Standard – CASR Part 67

CASR 67 The endocrine standards are found in the following paragraphs of **CASR Part 67**:

CASR 67.150	For medical standard 1	CASR 67.150(7) Table 67.150 1.16
CASR 67.155	For medical standard 2	CASR 67.155(7) Table 67.155 2.15
CASR 67.160	For medical standard 3	CASR 67.160(7) Table 67.160 3.15

For Medical Standard 1:

CASR 67 *“A person suffering from diabetes mellitus may be assessed as meeting medical standard 1 if the condition is satisfactorily controlled without the use of any anti-diabetic drug.”*
Table 67.150
1.16

For Medical Standard 2:

CASR 67 *“A person who suffers from diabetes mellitus may be assessed as meeting medical standard 2 if:*
Table 67.155
2.15

- a. *The condition is satisfactorily controlled without the use of any anti-diabetic drug; or*
- b. *If an oral anti-diabetic drug is used to control the condition:*
 - i. *The condition is under on-going medical supervision and control; and*
 - ii. *The oral drug is approved by CASA.”*

For Medical Standard 3:

CASR 67 *“A person who suffers from diabetes mellitus may be assessed as meeting medical standard 3 if:*
Table 67.160
3.15

- a. *The condition is satisfactorily controlled without the use of any anti-diabetic drug; or*
- b. *If an oral anti-diabetic drug is used to control the condition:*
 - i. *The condition is under on-going medical supervision and control; and*
 - ii. *The oral drug is approved by CASA.”*

2.4.3 Assessment of the Endocrine System

All applicants for Australian aviation medical certificates are required to complete a comprehensive screening questionnaire, to be physically examined by a DAME, and to undertake urinalysis for the presence of urinary glucose. In addition, applicants for Class 1 and Class 3 medical certificates are required to undergo fasting blood glucose estimation at the same time as they undergo five-yearly fasting lipid estimation. (CASA intends to introduce a requirement that applicants for Class 2 medical certificates will also be screened five yearly for diabetes mellitus by means of fasting blood glucose estimation).

When conducting an aeromedical examination, the DAME should note the presence of relevant risk factors for the development of endocrine or metabolic diseases and the presence of signs and symptoms suggestive or diagnostic of such conditions. Where such an endocrine condition is confirmed, evidence of secondary pathology or of accompanying complications should be sought and documented.

For example, risk factors for the development of diabetes mellitus include:

- Ethnic group
- Age >55 years
- Positive family history
- Obesity or significant overweight
- Abnormality of glucose tolerance
- Pregnancy
- Hypertension, dyslipidaemia, or clinical macrovascular disease
- Lack of regular exercise
- Use of diabetogenic medications.

Evidence of pathology secondary to diabetes mellitus may include vascular disease, retinal disease or renal disease.

2.4.4 Diabetes Mellitus and Impaired Glucose Tolerance

The incidence and prevalence of diabetes mellitus (of all types) has increased considerably in Australia in recent years. Up to 7.5% of the population now meets the diagnostic criteria for the condition (see [Biochemical Investigations](#) below). This is significant for aviation safety as diabetes mellitus is disqualifying for certification for aviation and air traffic control duties. The major aeromedical risk of diabetes relates to incapacitation (either overt or subtle), while it is also a major independent risk factor for a number of other incapacitating conditions—for example, stroke, acute myocardial infarction.

However, there is provision in the Civil Aviation Regulations for ‘a person who suffers from diabetes to be assessed as meeting the medical standard if the approved person conducting the relevant examination is satisfied that the diabetes is satisfactorily controlled without the use of an anti-diabetic drug’ or, for Class 2 and 3 medical certificate applicants, ‘where an oral anti-diabetic drug (approved by the Director of Aviation Medicine) is used to control the condition, the person provides evidence that he or she is undertaking on-going supervision and control of the condition’.

Classification of Diabetes Mellitus

Diabetes/diabetes precursor conditions are conventionally classified into four major types:

- Type 1 (absolute reduction in insulin production)
- Type 2 (resistance to the effects of insulin)
- Gestational
- Impaired glucose tolerance/impaired fasting glycaemia.

The majority of Type 1 diabetes mellitus sufferers use insulin regularly to manage the condition. Sufferers of Type 2 diabetes mellitus utilise a variety of management strategies: diet, oral hypoglycaemic agents and insulin, either singly or in combination.

Approximately one third of patients diagnosed with impaired glucose tolerance will subsequently have their glucose biochemistry return to normal, one third will continue to have impaired glucose tolerance and the remainder will eventually become sufferers of frank diabetes. Of aeromedical concern is the finding that all persons with impaired glucose tolerance have a statistically significant increase in their risk of developing ischaemic cardiovascular disease.



Biochemical Investigations

For medical certification purposes, any clinical suspicion of diabetes mellitus (such as urinalysis showing the presence of glycosuria) should be confirmed biochemically.

CASA recognises the following biochemical criteria, documented on at least two separate days, as confirming the diagnosis of diabetes mellitus:

- Fasting venous plasma glucose >6.9 mmol/l (less than 5.5 mmol/l—diabetes unlikely)
- Casual (random) venous plasma glucose >11.1 mmol/l (less than 5.5 mmol/l—diabetes unlikely).

Equivocal results of a fasting venous plasma glucose or casual venous plasma glucose estimation (between 5.5 and 6.9 mmol/l fasting or between 5.5 and 11.0 mmol/l casual) may indicate impaired glucose tolerance. In the event of an equivocal blood glucose result, DAMEs should order a 75 gram oral glucose tolerance test performed according to WHO 1999 guidelines and assessed according to the criteria in [Table 2.4-1](#).

Table 2.4-1: WHO oral glucose tolerance test assessment criteria 1999

Diagnosis	Criteria— Venous plasma Glucose concentration (mmol/l)
Diabetes mellitus <ul style="list-style-type: none">• Fasting value• 2 hr post glucose load	≥7.0 or >11.1
Impaired glucose tolerance <ul style="list-style-type: none">• Fasting value• 2 hr post glucose load	<7.0 and 7.8–11.0
Impaired fasting glucose <ul style="list-style-type: none">• Fasting value• 2 hr post glucose load	6.1–6.9 and <7.8
Normal <ul style="list-style-type: none">• Fasting value• 2 hr post glucose load	<6.1 and <7.8



Other Investigations

All applicants for medical (re-)certification who have either diabetes mellitus or impaired glucose tolerance must also provide to the DAME the results of all glycosolated haemoglobin (HbA1c) estimations performed in the previous twelve months. A minimum of three estimations is required, with the most recent being performed no more than one month prior to DAME examination. (HbA1c results should be reported in % HbA1c and should indicate the laboratory reference range for the estimations.)

In addition, CASA requires the following information and test results from applicants with diabetes mellitus:

- A recent report (within three months) from an endocrinologist or specialist physician:
 - Current status of control of diabetes
 - Whether the applicant has any history of hypoglycaemia/hyperglycaemia in preceding 12 months.
 - If so, whether there was any requirement for external intervention or assistance.
- A copy of the applicant's diary of ambulant blood glucose monitoring throughout the three months immediately prior to DAME examination. Desirable ranges are:
 - No readings below 2.8 mmol/litre
 - At least 90% of values between 5.5 mmol/litre and 10 mmol/litre.
- A copy of the applicant's most recent annual ophthalmological assessment detailing:
 - Clinical status
 - Visual acuity (with and without correction)
 - Presence of retinal disease
 - Presence of other ophthalmic pathology.
- A copy of a recent cardiovascular assessment by a cardiologist or specialist physician, including results of resting ECG and interval Stress ECG. The report should detail:
 - Clinical status
 - Presence and control of risk factors—for example, hypertension, smoking, hyperlipidaemia (total cholesterol, LDL and HDL)
 - Assessed risk of any acutely disabling cardiovascular event.
- The result of recent renal function tests, including 24 hour urine protein excretion.
- Certification that the applicant has completed and understood a course of diabetic management education.

There are no specific requirements for applicants who have impaired glucose tolerance or impaired fasting glycaemia where these conditions have not progressed to frank diabetes mellitus. However, CASA advises DAMEs to counsel affected applicants on the potential aeromedical certification consequences of their progression to frank diabetes mellitus and to initiate or refer them for appropriate clinical management.



Medical Certification of Persons with Diabetes Mellitus

On diagnosis, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

Requirements for medical (re-)certification are set out in the following paragraphs.

1. Persons with diabetes mellitus controlled by diet may receive medical certification at Class 1, 2 or 3 provided they meet the following criteria:
 - Evidence of stable blood glucose control:
 - Glycosolated Haemoglobin (HbA1c) taken within one month of assessment <7.5%.
 - Satisfactory reports as detailed under *Other Investigations*
 - Absence of complications that could result in sudden or subtle incapacitation when exercising the privileges of a licence.
2. Persons with diabetes mellitus controlled by diet and oral hypoglycaemic drug(s) may receive unlimited medical certification at Class 2 or 3 levels only. Such persons who seek Class 1 (re-)certification may be offered (re-)certification with an 'as or with co-pilot' restriction. Prior to their (re-)certification, CASA requires objective evidence that these applicants meet the following criteria:
 - No unacceptable side effects from drugs
 - Evidence of stable blood glucose control
 - No episode of symptomatic hypoglycaemia during the preceding 12 months
 - Glycosolated Haemoglobin (HbA1c), taken within preceding month <7.5%
 - Satisfactory reports as detailed in the previous section, Other Investigations
 - Absence of neurological, cardiovascular, ophthalmological, renal or other complications of diabetes mellitus that could result in sudden or unpredictable incapacitation when exercising the privileges of a licence.
3. Persons with diabetes mellitus who require insulin treatment do not meet the mandatory medical standards and are not fit for medical certification. However, in appropriate cases, the Director of Aviation Medicine may exercise discretion and issue a Class 2 medical certificate endorsed with the conditions 'as or with co-pilot only' and 'valid in Australian airspace only'. Prior to such certification, CASA requires:
 - Evidence of stable blood glucose control
 - No episode of symptomatic hypoglycaemia requiring intervention by others in the preceding 12 months
 - Serial Glycosolated Haemoglobin (HbA1c) estimations at two month intervals over the preceding 6 months—all results <7.5%
 - Satisfactory reports as detailed in the previous section, Other Investigations



- Absence of neurological, cardiovascular, ophthalmological or renal complications of diabetes that could result in sudden or unpredictable incapacitation when exercising the privileges of a licence.

Special Glucose Level Monitors

Individuals with diabetes mellitus who receive aeromedical (re-)certification must possess and use a memory chip glucose meter for ambulatory blood glucose monitoring. The meter, together with a readily absorbable source of glucose, must be carried by the applicant while exercising the privileges of a licence. (When real-time ambulatory glucose monitoring becomes readily available in Australia, CASA may require this form of monitoring instead of monitoring with memory chip glucose meters.)

Change in Treatment

When an applicant's oral hypoglycaemic medication is changed, or when its dosage is changed, he or she must not exercise the privileges of an aviation licence until the attending medical practitioner supervising the medication is satisfied that he or she is again stable and a DAME has recertified his or her fitness in accordance with CASA's relevant medical standards.

2.4.5 Thyroid Disorders

The major aeromedical concern accompanying thyroid disease is the potential for abnormally high or low levels of thyroid hormone to affect an applicant's cognitive function. Thyroid tumours have the potential to cause local symptoms or to metastasise to critical locations.

Investigation

Clinical suspicion of thyroid disease should be confirmed by appropriate investigations. These may include various imaging techniques, the use of fine needle biopsy, and biochemical thyroid function studies. CASA requires the results of thyroid function tests to establish that applicants are euthyroid prior to consideration for medical (re-)certification.

Medical Certification of Applicants Suffering from Thyroid Disorders

On diagnosis, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA. Requirements for medical (re-)certification are set out in the following paragraphs.

Goitre

Persons with goitre are acceptable for medical certification provided that there is no evidence of thyroid dysfunction nor of vascular or airways obstruction.

Hypothyroidism

Persons who are hypothyroid may be medically certificated provided Thyroid Function Tests (TFTs) demonstrate that adequate replacement therapy has been instituted and control maintained. TFTs should be performed annually for the first three years following initial diagnosis and periodically thereafter, as determined on a case-by-case basis, with serial results submitted with requests for medical re-certification.

Hyperthyroidism

Persons diagnosed as suffering from hyperthyroidism may be recertified once they are stable after surgery/isotope treatment/stable on medication and TFTs demonstrate that they are euthyroid. TFTs should be performed annually for the first three years after treatment is instigated and periodically thereafter, as determined on a case-by-case basis, with serial results submitted with requests for medical re-certification.

Thyroid Cancers

Thyroid cancer is disqualifying under Civil Aviation Regulations (1988). Persons diagnosed with thyroid cancer are obliged to refrain from performing licensed duties until they have been reviewed by CASA and a clearance to resume duties has been issued. While prognosis for cancer depends on many factors¹, in most cases of thyroid cancer CASA will require documentation of successful removal of the tumour, completion of any subsequent radiotherapy, and the absence of metastatic disease before considering an applicant for (re-)certification. Under certain circumstances, conditional certification may be offered to pilots suffering metastatic disease.

¹ These factors include the type of cancer, the stage of disease when discovered, the aggressiveness of the individual cancer, cell type, the types of treatment available, co-existing diseases and the general health of the individual.

2.4.6 Gout/Hyperuricemia

Gout and hyperuricaemia arouse aeromedical concerns because of the potentially incapacitating effect of acute symptomatic gout, and of the potential for high serum levels of uric acid to lead to symptomatic urolithiasis.

Investigation

Clinical suspicion of gout/hyperuricaemia should be confirmed by appropriate investigations, which may include estimations of serum uric acid levels and of urinary excretion rate. CASA will require the results of these investigations prior to considering an affected applicant for medical (re)certification. In the event that an applicant with gout suffers from abdominal pain, he/she should be investigated to exclude renal stone.

Medical Certification of Applicants Suffering from Gout/Hyperuricaemia

On diagnosis, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

CASA will certificate applicants with gout/hyperuricaemia when the condition is satisfactorily controlled (either by diet or by allopurinol) and has been asymptomatic for at least one month. Applicants should not exercise the privileges of a licence when being treated with colchicine.

2.4.7 Hypothalamic and Pituitary Disorders

Pituitary Adenoma

On diagnosis, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

Persons with pituitary adenoma will be assessed as unfit. Subsequent medical certification will depend on considerations of residual tumour, effects of raised intracranial pressure, any pressure effects on the optic chiasm, the effects of surgery or other treatment, the effects of any hormone excess or deficiency, and the effects of any drug therapy. In some instances, an applicant may be certificated with restrictions and appropriate surveillance following special medical assessment. Annual review, including reports from an endocrinologist or specialist physician and from an ophthalmologist, will be required.

Diabetes Insipidus

On diagnosis, inform the CASA Aviation Medicine Section and advise the applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

This condition is marked by polyuria resulting from failure of vasopressin secretion. Fluid deprivation tests are diagnostic. Treatment is with vasopressin or one of its analogues. After the treated condition has been stable for a minimum of six months, applicants may be medically certificated with restrictions and appropriate surveillance. All such cases require special medical assessment, and CASA will determine aeromedical certification, when appropriate, on a case-by-case basis.

2.4.8 Adrenocortical Disorders

Disorders of adrenocortical metabolism have the potential to incapacitate or impair the ability of a pilot or ATC to perform duties. In addition, the underlying causes of adrenocortical disorders may themselves have significant aeromedical implications.

Medical Certification of Persons Suffering from Adrenal Disorders

On diagnosis, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

- Aeromedical disposition will depend on cause and nature of adrenal disorder. Each applicant will be considered on a case-by-case basis and full documentation will be required. Applicants should be clinically stable and adequately treated clinically for a minimum of three months before being considered for certification.
- Cushing's Syndrome secondary to malignancy or ectopic ACTH secretion is disqualifying. Applicants with other causes may be certificated once the underlying disease has been effectively treated and hormonal status has returned to and been maintained within normal range for a minimum of three months.
- Applicants with Addison's disease may be certificated once their underlying disease has been effectively treated and their endocrine status has returned to and been maintained within normal range for a minimum of three months.

2.4.9 Parathyroid Disorders

Parathyroid disorders and associated disorders of calcium metabolism have the potential to impair a person's ability to control an aircraft or to act as an Air Traffic Controller. Hyperparathyroidism leading to hypercalcaemia increases the risk of renal stone formation, peptic ulcer, mental changes and cardiac arrhythmia. (Hypercalcaemia due to malignancy should be excluded in such cases.) The less common hypoparathyroidism, if associated with hypocalcaemia, may cause disabling neuromuscular irritability and abdominal cramps.

Investigations

Prior to (re-)certification of an applicant with parathyroid disease, CASA requires a report from an endocrinologist or specialist physician and copies of pre- and post-management serum calcium and PTH levels². If the applicant has suffered abdominal pain, CASA requires the results of imaging performed to exclude renal stones. Histology reports of specimens and the results of investigations to exclude underlying malignancy will assist in determination of the applicant's fitness for medical (re-)certification.

Medical Certification of Persons Suffering from Parathyroid Disorders

On diagnosis, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

- Applicants with hyperparathyroidism due to parathyroid adenoma may be (re-)certificated without condition(s) three months after surgical removal of the adenoma, provided that hormone and calcium levels have returned to and been maintained at normal levels. Hypercalcaemia due to malignancy must be excluded. Full clinical details are required.
- Applicants with hypoparathyroidism may be (re-)certificated when estimation of hormone and calcium levels demonstrates that they have been stable on treatment (calcium and/or Vitamin D analogues) for at least three months.

² Note that poor venepuncture technique may lead to spurious PTH and calcium results.

2.4.10 Hyperlipidaemia

Hyperlipidaemias are an important risk factor for the development of coronary artery disease, stroke and heart failure, which are important potential causes of in-flight incapacitation. Control of lipid levels is an important mechanism for reducing the risk of in-flight incapacitation due to vascular mishap. Similar considerations apply in the case of ATC staff.

Investigation

Blood for lipid estimation (including total cholesterol, HDL, LDL and glucose) should be drawn after fasting—that is, after the applicant has had nothing to eat or drink except water for 12-14 hours. Abstinence from alcohol for several days prior to the test may lower triglycerides levels. Dietary changes in the few days before testing have little effect on lipid levels.

Medical Certification of Persons Affected by Hyperlipidaemia

- Persons with elevated cholesterol/triglyceride levels controlled by dietary means and/or nutritional supplements are not of medical concern to CASA.
- CASA is primarily concerned over the potential for lipid lowering drugs to cause side effects of aeromedical significance. CASA will certificate pilots (both Class 1 and 2) or ATCs taking any of the lipid lowering drugs currently available on prescription in Australia, provided the applicant tolerates the medication well and experiences no significant adverse side effects. A minimum of one month of ground testing is required before the applicant returns to flying/controlling duties.
- Lipid estimation is part of CASA's cardiovascular risk management program. Should a Class 1 or Class 3 medical certificate holder be found to have an annual risk of cardiovascular event greater than 1% (currently a score of 15 or more points on CASA's cardiovascular risk assessment tool), he/she will be required to undergo a stress ECG per CASA protocol.

2.4.11 Obesity

Obesity, defined for CASA's purposes as a BMI >35, is of medical concern because:

- It is an independent risk factor for the development of vascular disease
- The physical dimensions of the obese person may reduce a pilot's ability to manipulate an aircraft's controls safely, or to escape in the event of accident or incident.

Investigation

Applicants who have a BMI >35 must be assessed by a DAME, who is to seek evidence of other pathology secondary to the obesity. Obese pilots will be required to demonstrate their ability to control an aircraft safely and to escape in the event of an emergency as part of their certification assessment. This may involve undertaking a CASA directed operational flight/ground check.

Medical Certification of Obese Applicants

Obesity per se is only of concern to CASA from an air safety perspective if an applicant suffers from another aeromedically significant disease or condition secondary to the obesity or his/her physical dimensions affect the safe exercise of the privileges of a licence. Such applicants will be assessed on a case-by-case basis. Obese applicants who are otherwise well and can exercise the privileges of a licence safely will be certificated without restriction.

2.4.12 Anorexia

Adult applicants with a BMI <18.5 may suffer from an eating disorder. Prior to certification, a DAME should assess them to exclude such disorders. See section 2.6 Psychiatry.

2.4.13 Appetite Suppressants

CASA will not authorise pilots to fly or ATCs to perform ATC duties when taking any appetite suppressant medication.