Specialised Testing Offered at QRS

Complex Assessment of Respiratory Disease
Complex Lung Function (spirometry, gas transfer and lung volumes)

Work Medicals - Accredited spirometry provider for CMWHS
Spirometry Testing & Complex Lung Function

Allergy & Atopy Testing
Fractional Exhaled Nitric Oxide (FeNO) & Allergen Skin Prick Test

Recreational Medicals - Dive/SCUBA medicals
Hypertonic Saline (HS) Challenge Test

QLD Police Service, Rural Fire Service & Defence Force medicals
Mannitol Challenge (MC) & Spirometry testing

Fitness to Fly Assessment
6-Minute Walk Test (6MWT) & Hypoxic Altitude Simulation Test (HAST)

Supplemental Oxygen Use Assessment - Qualification for Home Oxygen (MASS)
6-Minute Walk Test (6MWT) +/- supplemental Oxygen

Preoperative Risk Assessment
Cardiopulmonary Exercise Test (CPET)

Assessment of Respiratory Muscle Strength
Maximal Inspiratory & Maximal Expiratory Pressures (MIPS/MEPS) & Postural Spirometry

Test for Suspected Sleep Apnoea Syndrome
Overnight Oximetry*
**Note: overnight oximetry is not Medicare rebate claimable*

Work Medicals - Accredited Spirometry Provider for CMWHS

Spirometry:

Spirometry is a diagnostic tool for the evaluation of respiratory health. It is non-invasive and measures inhaled and exhaled volumes of air as a function of time, to identify if an obstructive or restrictive pattern is present.

It is utilised to monitor the health of workers' lungs, who are exposed to respiratory hazards, dusty environments or are required to wear respirators. Therefore, spirometry is recommended to be performed as part of employment medicals in conjunction with a chest X-ray or CT scan.

Resources Safety & Health Queensland (RSHQ) currently publishes a register of practices that provide spirometry (lung function) tests for the Coal Mine Workers' Health Scheme. Queensland Respiratory Services is an accredited practice which meets the Thoracic Society of Australia and New Zealand (TSANZ) standards for the delivery of spirometry for coal mine workers.

Allergy & Atopy Testing

FeNO: Fractional Exhaled Nitric Oxide

Measurement of fractional nitric oxide (NO) concentration in exhaled breath (FeNO) is a quantitative, noninvasive, simple, and safe method of measuring eosinophilic airway inflammation. Eosinophils are a major source of production of nitric oxide-derived oxidants and these cells play a key role in the symptoms of asthma and allergies. Asthmatic patients with high levels of NO in their exhaled breath indicate their inflammatory phenotype of asthma is Eosinophilic.

In asymptomatic individuals, including patients with well-controlled asthma, low FeNO suggests that ICS dose could be reduced or even withdrawn altogether. Testing FeNO levels is also useful for assessing adherence with corticosteroid therapy in patients with established asthma.

SPT: Skin Prick Testing

Skin prick testing is a diagnostic aid in atopic detection and can identify a specific allergen. It is generally performed by a prick test on the body's surface (cutaneous). The skin prick test is sensitive in the detection of the skin sensitizing antibody IgE. Small amounts of allergen are introduced into the epidermis and non-vascular superficial dermis and interact with specific IgE bound to cutaneous mast cells. Histamine and other mediators are released, leading to a visible "wheal-and-flare" reaction peaking after about 15 minutes.

At QRS we test for 22 common respiratory allergens. These include: dust mites, types of animal hair and epithelium (cat, dog & chicken), common QLD grasses and trees, moulds, and food (peanut, milk, egg & shrimp).

Recreational Medicals - Dive/SCUBA medicals

There are many risk factors present while diving that can trigger a severe exacerbation of asthma. The inhaled gas mixture itself is cold and dry, in addition there is an increased likelihood of accidental inhalation of salt water. Both actions dry out the airways, and in the hypersensitive airways of an asthmatic, this induces bronchial inflammation and bronchoconstriction. In exercise induced asthmatics the risk of exacerbation whilst diving is also likely due to it being a physically demanding exercise.

Due to these risks, a medical certificate is required prior to doing a diving course. If there has been a history of asthma or use of inhalers, then a hypertonic saline challenge is useful to assess the degree of irritability of the airways and thus better assess the risk involved in diving.

Hypertonic Saline Challenge Test:

4.5% saline (similar concentration to sea water) is nebulised, starting with a 1-minute exposure and doubling up to 8 minutes until there has been a 15% decrease in FEV1 or more or until 15-18 g of solution has been delivered. If this test has a positive result (15% reduction in FEV1) then the person is susceptible to an acute onset of asthma while underwater, and it is recommended that they should not dive until adequately treated for asthma. If the test is negative, this reassures that asthma is unlikely to develop while diving.

QLD Police Service, Rural Fire Service & Defence Force medicals

To assess medical eligibility of candidates applying for ‘high risk’ job roles (ADF, QPS & QRFS) with current or previous asthma symptoms suggestive of exercise-induced bronchoconstriction (EIB) a bronchial provocation test is to be performed.

Mannitol Challenge Test:

Mannitol (Aridol) is an indirect osmotic bronchial challenge test indicated for identifying bronchial hyperresponsiveness to assist in the diagnosis of Asthma. Mannitol is classed as the Gold Standard of bronchial provocation testing and studies have found it to have a high level of sensitivity in patients with underlying EIB. During the test Mannitol is inhaled at an increasing dose, with spirometry performed between each dose. This is continued until a fall in FEV1 of 15% from baseline or an incremental fall of 10% in FEV1 between consecutive Mannitol doses (positive result) or until a cumulative amount of 635mg has been inhaled without a 15% decline in FEV1 (negative result). If the result is positive, it is indicative of current asthma and the severity of airway hyperresponsiveness is given. Treatment with an ICS is recommended, followed by a repeat Mannitol challenge test for future medical clearance.

Fitness to Fly Assessment

Increasing hypoxia with increasing altitude can be a potential problem for patients with underlying medical conditions such as hypoxemic chronic airway obstruction (chronic bronchitis and /or emphysema), pulmonary vascular diseases (pulmonary arterial hypertension) and interstitial lung disease.

6MWT: 6-Minute Walk Test

A quick, non-invasive test assessing the cardiopulmonary response to light exercise.
Oxygen saturation (SpO2), heart rate and the distance that a patient can walk (on a flat surface) is measured, evaluating the global and integrated responses of all body systems involved during exercise. Often used for the

assessment of functional status of patients with COPD, pulmonary arterial hypertension, and interstitial lung disease. If oxygen desaturation occurs below 88%, there is an indication of a risk of desaturation in flight.

HAST: Hypoxic Altitude Simulation Test

A more complex test assessing the cardiopulmonary response to the inhalation of a hypoxic gas mixture equivalent to the partial pressure of inspired oxygen at maximum cabin altitude (~15%02). Throughout this test oxygen saturation (SpO2) and heart rate are measured at rest and during light exercise (standing and sitting). If supplemental oxygen is indicated (SpO2 desaturation below 88%) oxygen titration is performed.

Supplemental Oxygen Use Assessment - Qualification for Home Oxygen (MASS)

6MWT: 6-Minute Walk Test +/- supplemental Oxygen

Assessing the cardiopulmonary response to exercise on both room air in contrast to when a patient has been correctly titrated with oxygen therapy. Useful for assessing the benefits of home oxygen use and qualifying for the Medical Aids Subsidy Scheme (MASS).

Oxygen saturation (SpO2), heart rate, Borg rating of perceived exertion (RPE) and the distance that a patient can walk (on a flat surface) is measured, evaluating the global and integrated responses of all body systems involved during exercise. If oxygen desaturation occurs below 88% the test is then repeated on titrated supplemental oxygen therapy. If there is a significant improvement in walk distance, RPE and measured oxygen saturations, the patient may qualify for MASS.

Preoperative Risk Assessment

CPET: Cardiopulmonary Exercise Test

CPET is a maximal exercise test, assessing the cardiopulmonary function during incremental exercise and combines the routine measurements of the electrocardiogram (ECG), blood pressure, SpO2 and work (watts) with the analysis of exhaled gases. Cardiopulmonary variables measured during this test allows clinicians to study the response of these systems under controlled metabolic stress.

The volume of oxygen uptake each minute by the muscles for the oxidative process (VO2), increases during exercise proportionate to the work rate that is being performed. To satisfy the increased metabolic demand, the lungs, heart, pulmonary circulation, and peripheral circulation respond appropriately to the increase in metabolic demand. As exercise intensity increases, one or more of these essential systems may reach its maximal response, imposing a limitation to exercise.

Information gained from CPET can be used to estimate the likelihood of perioperative morbidity and mortality and assist clinicians in decisions about the most appropriate management.

Assessment of Respiratory Muscle Strength

Maximal Inspiratory & Maximal Expiratory Pressures (MIPS/MEPS)

A convenient non-invasive measure of respiratory muscle strength at the mouth to evaluate potential respiratory muscle weakness found in neuromuscular diseases and diaphragm paralysis. Postural spirometry is also performed to assess the change in the forced vital capacity (FVC) when in supine position.

Test for Suspected Sleep Apnoea Syndrome

Overnight Oximetry

Pulse oximetry is a non-invasive diagnostic and pre-screening tool in patients suspected of sleep apnoea - often performed to indicate if a sleep study is recommended. The patient takes home a wearable oximeter, to monitor the oxygen saturation and pulse events during sleep.