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Medical Newsletter

April 2019 - Newsletter 5

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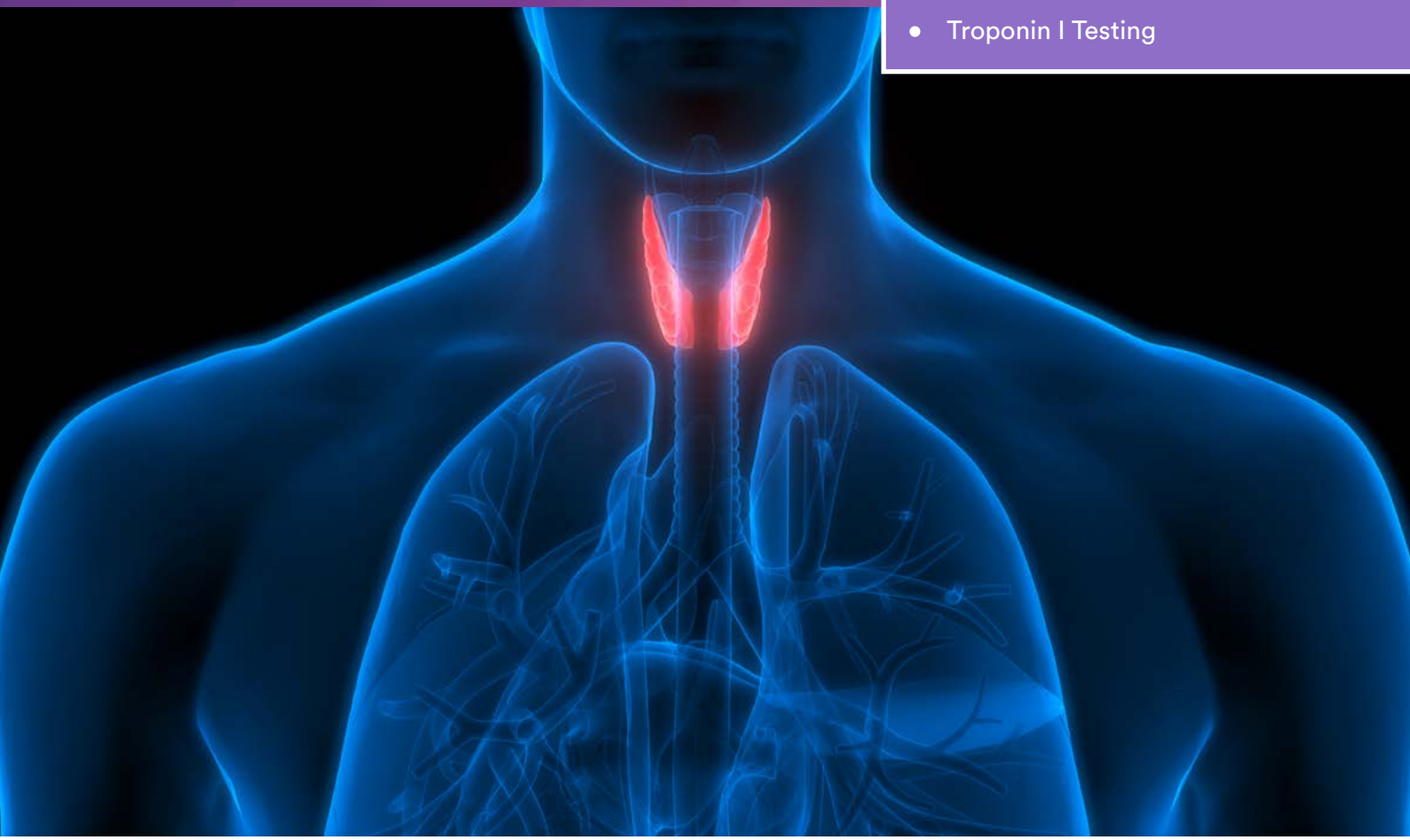


Thyroid Function Testing Update

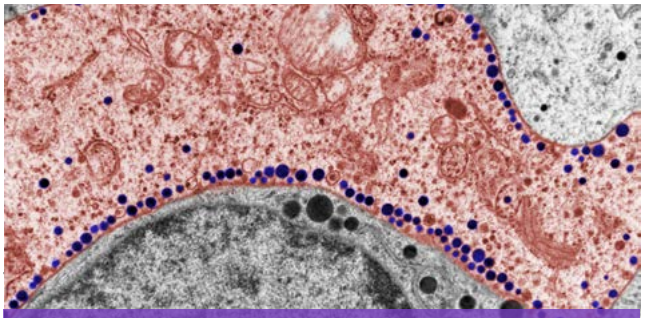
By Dr David Deam & Dr Damon Bell

Altered thyroid function is common in the community, and its prevalence in Australia is estimated to be as high as 10 per cent of the general population. This figure is in line with statistics and rates seen internationally. For example, the American Thyroid Association reports that “more than 12 per cent of the US population will develop a thyroid condition during their lifetime”. Some of the factors influencing this include autoimmune thyroid disease and iodine intake, and many medical interactions may contain thyroid disease as a component. This article will provide a brief summary and update of thyroid function testing.

The thyroid function tests

The main thyroid function tests are Thyroid stimulating hormone (TSH) and Free Thyroxine (FT4).

TSH is a glycoprotein that is synthesised and secreted by the thyrotroph cells in the anterior pituitary gland. It stimulates the thyroid gland to secrete T4 and T3. Although the thyroid gland secretes T3, the majority of T3 is formed in peripheral tissues by the enzymatic conversion of T4 to T3.



Thyrotrope (TSH) cell (light brown) showing its typical small peripheral secretion grains

Iodine is integral to the formation and structure of thyroid hormones.

Because the majority of thyroid hormones are bound to various proteins the measurement of the free hormones, free T4 and free T3, correlate better with the patient's clinical condition.

TSH responds in an inverse log-linear fashion to maintain the thyroid hormones within the correct range.

What to request

The main thyroid function tests are Thyroid stimulating hormone (TSH) and Free Thyroxine (FT4).

TSH is the first-line assessment for detecting thyroid dysfunction, and is the only test funded by Medicare to screen for conditions when there is no history of thyroid problems.

In patients with known thyroid disease, FT4 (and sometimes-free T3) are required in addition to TSH to better assess the cause of thyroid dysfunction.

When "thyroid function tests" are requested in our laboratory without a clinical history, we initially perform a TSH measurement and proceed to FT4 measurement if the TSH is abnormal.

Medicare requirements

Medicare rules regulate that a Medicare eligible request for thyroid function testing (TSH and Free T4) must have a complying clinical indicator written on the pathology request slip by the requesting doctor.

These clinical criteria are:

A) The patient has an abnormal level of TSH;
B) For the purpose is monitoring thyroid disease in the patient; or
C) To investigate the sick euthyroid syndrome if the patient is an admitted patient; or
D) To investigate dementia or psychiatric illness of the patient; or
E) To investigate amenorrhoea or infertility of the patient;
F) The medical practitioner who requested the tests suspects the patients has pituitary dysfunction;
G) The patient is on drugs that interfere with thyroid hormone metabolism or function.

Subclinical conditions

In the early stages of thyroid disease, the first test to become abnormal is usually the TSH level. The finding of normal free T4 levels and an abnormal TSH level may indicate early or developing thyrotoxicosis or hypothyroidism. Although this may not need to be treated, it requires follow up and investigation of the possible cause of the abnormality and to determine if it normalises or progresses to overt thyroid disease in the future.

Medications

A number of drugs may influence thyroid function. The most common is Amiodarone, which has several effects on thyroid function including both hyperthyroidism and hypothyroidism. This is caused by several factors including amiodarone having a significant iodine content and decreasing T4 to T3 conversion in the peripheral tissues.

Lithium is also a drug that may influence thyroid function tests and commonly causes hypothyroidism.

Other drugs that may influence thyroid function include steroids, anticonvulsants and iodine containing preparations.

Pregnancy

There has recently been greater interest in thyroid function tests during pregnancy. During the first trimester, high levels of hCG can have a TSH-like effect on the thyroid gland. This causes a lower TSH during pregnancy and most laboratories now have specific reference ranges for TSH in pregnancy.

Pregnancy requires a 30-50% increase in thyroid hormone secretion, and maternal T4 is important for foetal development for the first 18-20 weeks of gestation.

Thyroid dysfunction affects 2–3 % of pregnant women and can lead to adverse pregnancy outcomes. As a result, women should be assessed during pregnancy for any adverse thyroid conditions. It is recommended that specialists are involved in the management of raised TSH levels with four weekly thyroid function monitoring to 20 weeks gestation. After that period, regular monitoring can be decreased.

In Grave's disease, TSH receptor antibodies can cross the placenta and cause foetal issues and post-partum thyroid dysfunction in the baby. This is again better managed by specialists in the area.

There is some controversy amongst the various guidelines around universal screening during pregnancy, and the thresholds for treatment of subclinical or mild hypothyroidism. We suggest following the local and/or national guidelines depending on local practices.

Elderly

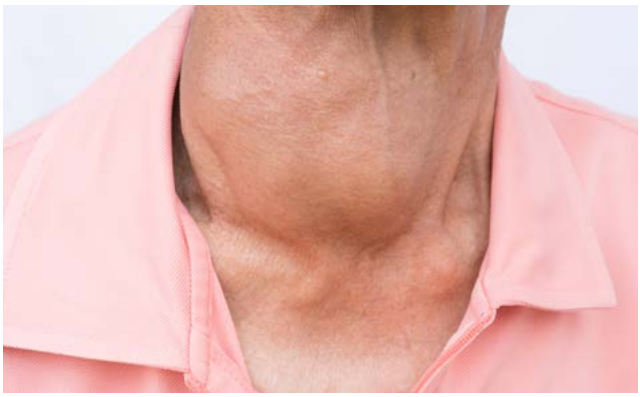
Research has demonstrated that the frequency of thyroid disorders increases with age - significant when we consider our ageing population.

A mild increase in TSH (up to 7 mIU/L) is not uncommon in the elderly and has been shown not to be associated with adverse outcomes. It probably does not require treatment unless there are specific clinical indications.

Testing in Hyperthyroidism and Hypothyroidism

During the treatment of hypothyroidism and hyperthyroidism, changes in TSH usually take four to six weeks to stabilise. Testing before this period makes the results more difficult to interpret.

Note that after taking thyroxine medication, the free T4 level may become elevated 4-6 hours after the dose. Therefore, it is better to test the patient at least four hours after their thyroxine dose.



Other tests and investigations

Other useful tests to determine the cause of abnormal thyroid function tests include thyroid antibodies (thyroid peroxidase and thyroglobulin antibodies), which are associated with autoimmune thyroid disease, and TSH receptor stimulating antibodies that are associated with Graves' disease.

Ultrasound and Nuclear Medicine scans are required to determining the size, structure and sometimes function of the thyroid gland and to assess any thyroid nodules.

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Cardiac Testing and Arrhythmias in General Practice

By Dr Christopher Goods

Dr Christopher Goods is an interventional cardiologist with a special interest in ischemic heart disease. Here, he discusses the effectiveness of Holter monitors for patients presenting with heart irregularities, as well as the important role that GPs play in this area of analysis and care.

Holter monitors are universally regarded as the first-line test for assessing cardiac issues: they are a small, battery-powered device worn by the patient for 12-48 hours as they go about their daily lives.

Much like an ECG, the device uses electrodes and leads to pick up a patient's heart-rate and heart rhythm, as well as record when they experience chest pains or arrhythmias.

An inexpensive, painless and non-invasive test, there is good reason as to why clinical use of the device is widespread – and, fortunately, the vast majority of GPs are well across Holter monitors' efficacy and value.

When to use a Holter monitor

Holter monitors are the undisputed, the simplest and the best investigation tool we have to look for intermittent arrhythmias.

We also use it for people that are experiencing exertion-related shortness of breath, dizziness and chest pains – because sometimes those symptoms can be a result of underlying heart problems that patients cannot necessarily feel in the first instance. If a patient is short of breath, it can be due to arrhythmias, both fast or slow heartbeats, or tachyarrhythmia.

We also tend to see a lot of young people presenting to our practice with anxiety issues or heartbeat irregularity which we often find is due to alcohol or caffeine consumption. These individuals are prime candidates for Holter monitoring – healthy, young people who we don't usually expect to have underlying, organic disease. Instead, in most cases, our monitoring just finds some ectopic beats or tachycardia or periods of increased heart rate.

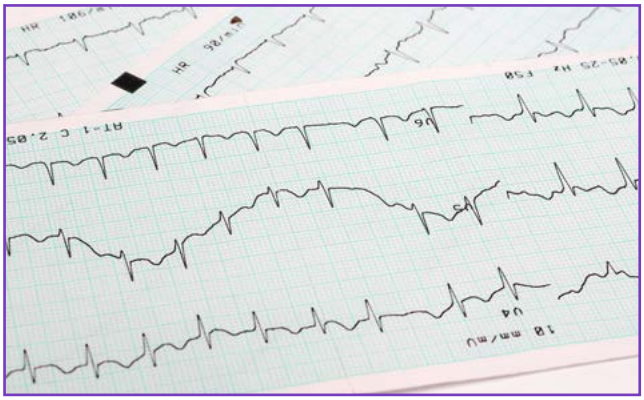
As noted above, Holter monitors are most commonly used for patients over the course of a day or two. However, if a patient is experiencing quite infrequent arrhythmias, we sometimes choose to undertake a longer period of analysis – for example, a seven-day event monitor. In extreme cases, we may even refer the patient on for an electrophysiology study, where an electrical cardiologist (or electrophysiologist) uses electrical intervention to stimulate the heart and bring on the arrythmia. But this is quite rare, and regular use of Holter monitors is definitely the most effective tool as far as it goes for arrhythmias.

From a patient's point of view

When we first propose Holter monitoring to patients, and explain that the machines must be worn at all times during the assessment period (including during sleep), the immediate misconception is that they will need to stay in a laboratory overnight. But like anything, education is key. We begin by explaining that Holter monitoring is painless and non-invasive and that, while wearing the device, they can go about most of their routine, daily activities. There are a few limitations they should be made aware of, for instance, patients can shower but they cannot go swimming, and we prefer they don't use moisturising cream as the electrodes won't stick.

Clinicians will often ask that patients keep a diary of all their activities while wearing the monitor, including the start time and duration for each. Similarly, any specific symptoms they experience when wearing the monitor should be recorded as well. The more information for the clinician assessing their Holter results, the better.

Interpreting the data and next steps



Once the monitoring period concludes, Holter devices allow clinicians to send the data off for analysis to determine any variations or inconsistencies. As you can imagine, the device creates a significant amount of data, so it is very much computer-assisted. So while a technician or clinician does have the option of going through an entire report (eg., the full 24- or 48-hour period), the analysis program will zero in on any specific inconsistencies and irregularities.

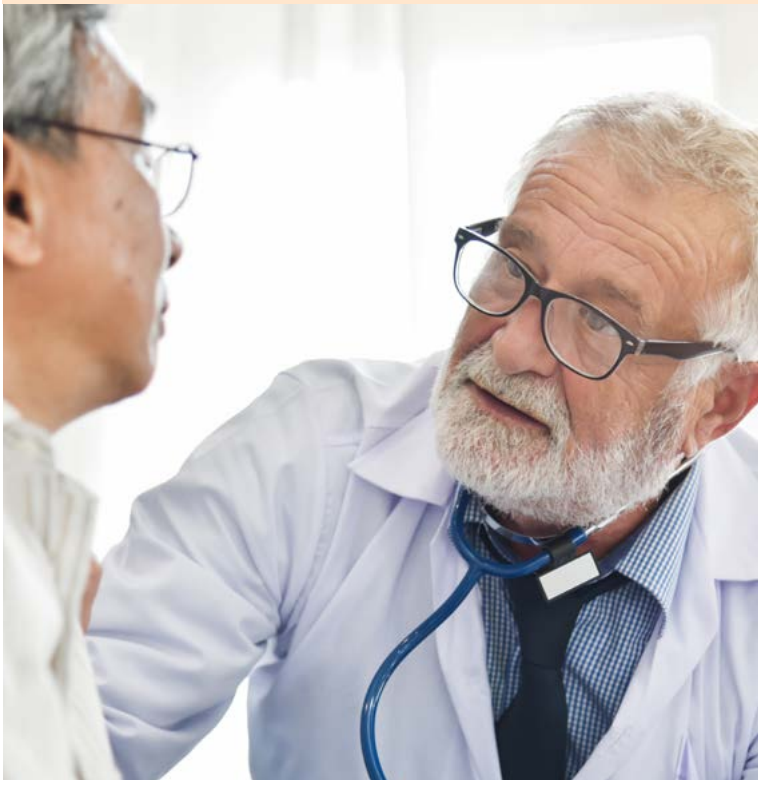
Most of the time, the results of Holter monitoring will show no major, underlying cardiac conditions. I would say that about 95 per cent of the time, we are able to assure the patient that everything looks quite normal. However, there are obviously instances where the data reveals an issue that requires treatment. This will usually come in the form of medication, however, in severe cases, a patient may require a pacemaker.

I often say that there is an art in determining which patients require a pacemaker to be installed, as there can be grey areas when assessing Holter results. The worst outcome would be if you recommend a pacemaker be installed and then the patient continues to experience fainting due to another issue or health complication. As a result, correct interpretation of Holter data is crucial.

The role of GPs in cardiac testing

Generally, cardiologists prefer that patients presenting with the common warning signs discussed above – palpitations, irregular heartbeats, shortness of breath, and so on – actually undertake Holter testing from their GP before they are referred on.

In this case, the patient can get a Holter, undertake the assessment period, and then as they wait to see a cardiologist, the cardiologist already has the data and results on-hand. This would take away a step in the diagnostic process, allowing the cardiologist to make the most informed judgement from the outset.



About the author

Dr Christopher Goods

MBBS, FRACP

Interventional Cardiologist at Box Hill, Maroondah and The Angliss Hospitals
Private Practice at Knox Private and Epworth Eastern Private

Dr Christopher Goods is an Interventional Cardiologist with a special interest in coronary angiography and coronary stenting procedures performed via the radial artery approach. He undertook his specialist training at the Austin Hospital from 1991-1992 and Monash Medical Centre in 1993. He spent a further two years at the University of Alabama, USA where he was involved in pioneering stent research.

On returning to Australia he worked as interventional cardiologist at the Alfred hospital for a period of ten years.

He currently holds public appointments at Box Hill, Maroondah and The Angliss Hospitals and runs a comprehensive private practice at Knox Private and Epworth Eastern Private Hospitals.

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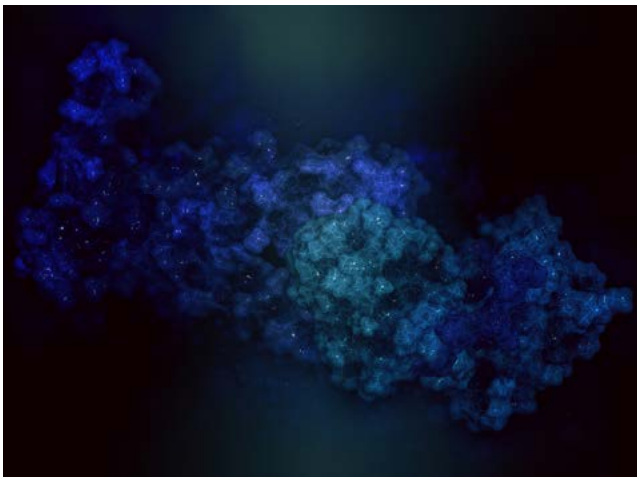
A new more sensitive Troponin I test is coming.



Australian Clinical Labs is pleased to advise that a new more sensitive Troponin I assay will soon replace our existing laboratory based troponin assay in the first week of April.

The assay uses two new monoclonal antibodies and reagents to deliver a 10 fold increase in test functional sensitivity.

What Will Change?

1. Troponin units will change from ug/L to ng/L due to the improved sensitivity.
2. Reference Ranges
   New reference ranges will reflect the performance of the new assays.
   We will also introducing gender specific ranges which are more significant due to the improved sensitivity of the assay
3. The reference ranges differ slightly depending on the type of instrument used.

Instrument	Males	Females
	Serum 99% ng/L	Serum 99% ng/L
Siemens Centaur	58	40
Siemens Atellica	54	39
Siemens Dimension	72	48

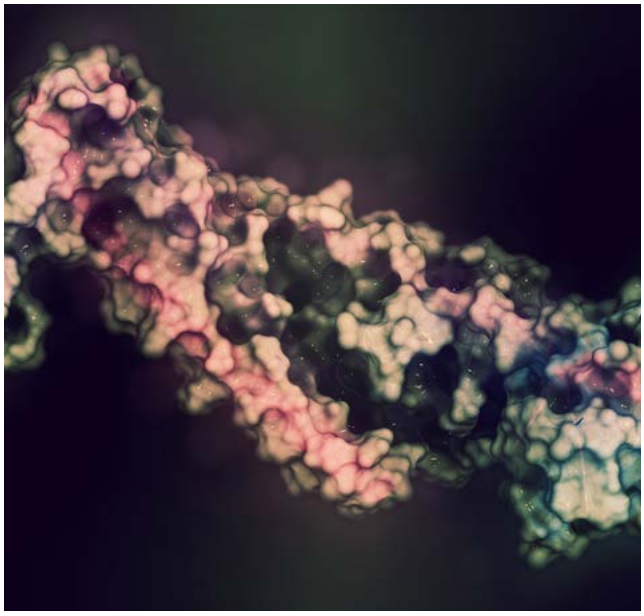
4. There will be a higher number of results where the Troponin I level is measurable.

What Will Remain The Same?

1. Turnaround times for troponin results
2. Quantitative comparisons cannot be made between Troponin I and T, or between point of care (POC) devices and laboratory-based immunoassays.
3. Troponin elevation is not specific for acute myocardial infarction.

Advantages of a High-Sensitivity Troponin I Assay

- Increasing sensitivity of troponin assays enables detection of smaller areas of necrosis
- Optimise negative predictive value: high-sensitivity troponin allows for a more rapid triage of patients suspected of AMI based on improved discrimination of low-level troponin I concentrations at presentation as well as over time.
- For early presenters: low-end precision allows early detection of significant change in troponin I concentrations, which may not have yet exceeded the 99th percentile limit.
- A Serial sampling strategy is still recommended (preferably using the same instrument). Time between tests may be shortened with hsTNI assays based on published guidelines. Chest pain protocols can be reviewed and modified if necessary to reflect the new assay.



What classifies a Troponin assay as having high sensitivity

- This requires a test coefficient of variation of < 10% at a 99th percentile level of a normal population, and
- Measureable concentrations below the 99th percentile should be attainable with a concentration above the assay's limit of detection for at least 50% of healthy individuals

Note that the the high-sensitivity refers to the assay's performance characteristics, not a difference in form of cardiac troponin being tested.

For further information, please contact your local Australian Clinical Labs Pathologists

Local pathologists near you

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Thank you

Focus Haematology Event

The second Focus Haematology course was run in Melbourne on the weekend of the 16th and 17th of February. The course was attended by Laboratory Haematology registrars from around Australia and is a new initiative by Australian Clinical Labs to support laboratory training for future haematologists.

The course involves presentations from national experts in the area of Haematology, with a focus on exam preparation for laboratory registrars. Attendees are presented with over 8 hours of useful content, including topics such as 'Anticoagulation Strategies' & 'How I passed the RCPA Haematology Exam', allowing them to focus on subjects relevant to the forthcoming Royal College of Pathologists Haematology Exam.

This is a first-of-its-kind course in Australia, and like the first event in 2018, the recent event in February received very positive feedback from the registrars: "This course is a godsend for us," noted one attendee, "a must-attend for haematology registrars," said another.

The course is coordinated by Dr Chris Barnes, Clinical Labs' National Director of Haematology, and featured insight presentations from some of Australia's top specialists. We would like to sincerely thank Immulab, our key sponsor for the event.

Clinical Labs Educational Modules

Watch our educational video presented by Anatomical Pathologist, Dr Catherine Uzzell. The video is just over 8 minutes in duration and discusses Molecular Screening for Sexually Transmitted Infections.

clinicallabs.com.au/doctor/educational-modules

About Dr Uzzell

Dr Catherine Uzzell

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Dr Uzzell has an interest in women's health and gynaecological pathology and cytology. She has over 13 years of experience in reporting cytology, with particular emphasis on gynaecological cytology, and has presented to many general practice and specialist groups regarding changes to the Cervical Screening Program. Dr Uzzell has a special interest in Dermatopathology and is a member of the Australasian Dermatopathology Society.

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