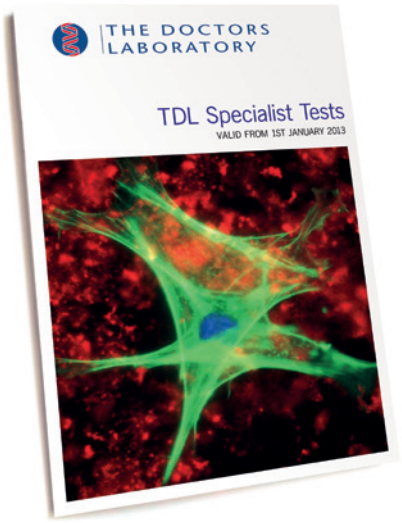
TDL Laboratory Guide 2013



Every year we review requesting patterns, frequency of use, new best practice, and include new and relevant assays into the test menu. We also try to incorporate relevant feedback received over the past year, to keep profiles and test menus as updated as possible. The developments in diagnostic pathology are very exciting. We hope this new guide captures some of the important trends.

Sample types and turnaround times have been updated throughout in the LABORATORY GUIDE with entries for more than 1000 of the most frequently requested tests. In addition, we have prepared a separate booklet ***TDL Specialist Tests*** which provides an A-Z test look up reference for more esoteric tests. If you are not able to find the test or service you are looking for, do please contact the laboratory on **020 7307 7373** for more information.

The website **www.tdlpathology.com** A-Z Test Index shows this menu of tests with the additional benefit of test Reference Ranges now being given with each test.

The laboratory guide has a NEW LOOK – sample blood types for all tests are now shown by the colour of the vacutainer top A B C F G H K in all colours (purple, gold, light blue, red, grey, green and dark blue).

CHANGES FOR NEW TESTS, UPDATES AND TDL PROFILES ARE WITH EFFECT FROM 1ST JANUARY 2013

SERVICE: NEW, UPDATES AND CHANGES

UPDATE – Rapid results

We continually review and update the methods for receiving requests and reporting results electronically between practices and the laboratory. A number of innovative report formats are now available.

Hard Copy
Results are posted out on the day they are reported.

Autofax
As tests are authorised, results can be faxed automatically.

Email
Results can be sent in encrypted format to any number of predetermined email addresses.

Secure Link
Bidirectional requests and results can be delivered electronically to a number of integrated practice systems or practice software that accepts data in an HL7 format.

TDL e-View
Registered users can view all their results online. This is a secure Login/Password protected look-up system, with a cumulative results reporting function. This can be accessed any time, from anywhere, through the internet.

UPDATE – Reference Ranges

These are now given on the TDL website A-Z Test Index **www.tdlpathology.com**

NEW – Telephone Payment

Patients now have the option to settle invoices online using credit card payment. The option is detailed on every patient invoice.

NEW – Courier Booking Software 08450 999 888

TDL Collect has grown significantly to become one of the most recognisable and successful same day despatch operators in London, carrying out in excess of 1500 collections every day.

What does this mean?

Time for an upgrade! New courier management software with GPS and hand held technology which, together with great potential for management information, allows for live vehicle tracking, customer web booking, auditable job trails with electronic signature capture, and live job progress updates using email or SMS.

Each practice will be allocated a **unique customer account number** – when you are given this, use it for speed and accuracy of booking.

SCREENING: NEW, UPDATES AND CHANGES

NEW – TDL TINIES for Remote Testing/Self Collection

tinies@tdlpathology.com

The demand for an increased range of Sexual Health and other Screening tests using remote testing/self-taken small volume blood samples (home collection) and postal pathology has been developed using TDL TINIES.

TDL TINIES (packs with instructions) can be fulfilled by TDL and sent directly to the patient (by arrangement) or supplied directly to doctors or healthcare companies. Not all screening tests are suitable to be taken as a TDL TINY sample. IMPORTANT: This is not point of care testing. All testing is undertaken in the laboratory. Test results from postal samples are always returned directly to the healthcare company or doctor, not to the patient.

Up to four tests can be taken from one TINY sample.

Sexual Health

• HIV/p24 Antigen • Hep B sAg • Hep C Abs • Hep C Antigen for early detection • Syphilis IgG/IgM

Examples of Screening Tests using TDL TINIES

• HbA1c • Hormones • AMH • Thyroid function • PSA, etc.

For information and packs, please contact Annette Wilkinson on **020 7307 7343** or email **tinies@tdlpathology.com**.

BIOCHEMISTRY: NEW, UPDATES AND CHANGES

NEW – Active B12

page 19

Active – B12 (holotranscobalamin): the next level of B12 Testing replacing Total Vitamin B12

Conventional tests for Vitamin B12 measure total serum Vitamin B12, not metabolically active B12. It is better understood now that total B12 levels are not as clearly correlated with clinical symptoms as they might be. Clinically significant Vitamin B12 deficiency can occur and B12 status be misclassified, even when Total Vitamin B12 levels are apparently within normal range.

It is fair to say that Active B12 and Total B12 do show good agreement at the extremes (ie 'very deficient' or 'not at all deficient') but there is a large grey zone of indeterminate range between normal and abnormal which is likely to be misclassified if total serum B12 alone is relied upon. It is therefore expected that by testing with Active B12, findings will be less in number, but more clinically relevant.

All Vitamin B12s will be replaced by ACTIVE B12 whether requested as a single test, or requested with red cell or serum folate. The sample type and turnaround time remain unchanged.

NEW – Pre-eclampsia Screening, Antenatal Bloods from 20 weeks

page 19

Pre-eclampsia (PE) is a serious complication in pregnancy which affects both the mother and unborn child. It is defined as pregnancy-induced hypertension and proteinuria. It is well recognised, and is a major cause of maternal, fetal and neonatal morbidity and mortality. The disorder generally develops early in the first trimester. Down syndrome has an incidence of 1:700. Early onset pre-eclampsia is 3 to 4 times more prevalent and is associated with 1:200 pregnancies.

Placental Growth Factor (PlGF) is the most discriminating biochemical marker for pre-eclampsia and especially for early onset pre-eclampsia. Levels of sFlt-1/PlGF are determined in parallel and the sFlt-1/PlGF ratio are calculated and this ratio has been shown to be a better predictor of PE than either measure alone. The automated Roche sFlt-1/PlGF ratio allows for confirmation of pre-eclampsia with a sensitivity of 82% and a specificity of 95% at a cut-off of 85. This assay is validated for pre-eclampsia testing from 20 weeks gestation.

Although the tests are run separately, for convenience a blood sample may be drawn at the same time/same tube as first trimester PAPP-A and free Beta HCG. If Non-Invasive Prenatal Testing (NIPT) becomes the test of choice, the maternal blood would need to be collected using NIPT special tubes, and one additional SST/Serum tube would need to be taken for the pre-eclampsia testing.

NOTE: the pre-eclampsia screen will not be included in the Antenatal profile until later in the year.

UPDATE – HbA1c or GHB (Glycosylated Hb) page 17

UPDATE – Diabetic Profiles 1 and 2 page 21

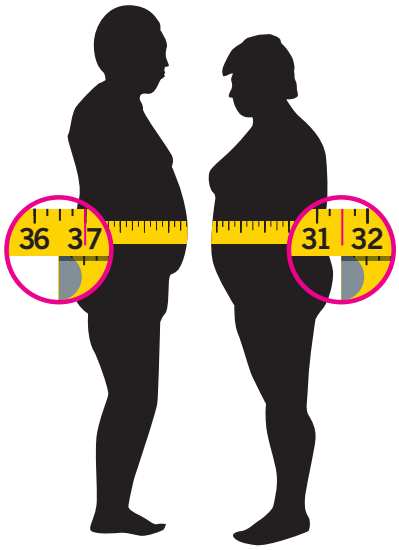
HbA1c occurs when haemoglobin joins with glucose in the blood. The more glucose found in the blood the more glycated haemoglobin (HbA1c) will be present. Because red blood cells survive for 8-12 weeks before renewal, by measuring HbA1c, an average blood glucose reading can be returned. Blood glucose levels fluctuate constantly, so for micro adjustments and regular checking, blood glucose testing is advised. But for screening or review, HbA1c levels, which change very slowly over a 10 week period, will give a very accurate status of a patient's glucose level.

This is a very crude reason to control glucose levels but if patients with Type 2 Diabetes Mellitus (T2DM) were to reduce their HbA1c level by only 1%, there would be an overall:

19% reduction in cataract extractions

16% decrease in heart failure

43% reduction in amputation or death due to peripheral vascular disease



T2DM Risk Factors

- Ethnicity – Afro-Caribbean/South Asian (5 times more likely to have diabetes)
- Family history: the closer the relative, the higher the risk
- BMI over 23
- Aged over 40 years old
- Poor blood circulation
- History of heart attack or stroke
- High blood pressure (over 140/90 mm/Hg)
- Pregnancy – or history of gestational diabetes
- Obesity and 'Western Diet'
- Polycystic ovary syndrome
- You're overweight or if your waist is 31.5 inches or over for women; 35 inches or over for Asian men and 37 inches or over for white and black men.

UPDATE – Liver Disease: ELF and FIBROTEST page 17

Liver Disease in England is rising. There was a 25% increase in liver disease deaths between 2001 and 2009, in contrast to other major causes of death, which have been declining. The key drivers for this growth are obesity, alcohol and hepatitis C and hepatitis B[1].

What is Fatty Liver Disease?
There should be little or no fat in a healthy liver. Fatty liver is the name given to a condition in which there is too much fat in the liver. The effects of having fat in the liver over a long period may lead to inflammation, swelling and tenderness and then to scarring (fibrosis). It can be caused by excess alcohol or by insulin resistance, hepatic steatosis, and frequently pre-diabetes or Type 2 Diabetes. Liver fat accumulation may range from simple to severe non-alcoholic steatohepatitis (NASH). 30-40% of patients with steatosis are at risk of developing fibrosis and potentially cirrhosis.

Cirrhosis linked to NASH has a similar liver related mortality as viral associated cirrhosis. Obese patients with fatty liver are at increased risk for early morbidity and mortality – and it begins at a young age. Patients with NAFLD have a worse overall survival than patients with alcoholic related fatty liver disease. Non-alcoholic fatty liver disease (NAFLD) has become the most common chronic liver disease in Western countries.

Typically the first test used in the evaluation of patients with suspected fatty liver is an ultrasound – but this does not provide accurate quantification of the amount of fat present and is less accurate in patients who have a large body mass. A liver biopsy is the only way to confirm the diagnosis of NASH and grade the severity of the disease and stage fibrosis – but this is invasive, carrries some risk, is expensive and not appropriate for screening. The fact that at least 70-80% of obese patients have NAFLD, and many with NASH highlights the need for non-invasive diagnosis. Development of non-invasive biomarkers will change the management of the disease in the near future but to date the two most regularly requested non-invasive markers are:

FIBROTEST: an algorithm of five fibrosis markers.

ELF (Enchanced Liver Fibrosis): an algorithm of three different fibrosis markers.

Review shows comparable diagnostic accuracy for non-invasive staging of liver fibrosis.

1 Deaths from Liver Disease March 2012.

HAEMATOLOGY: NEW, UPDATES AND CHANGES

CHANGE – Coagulation Profile 1 and Coagulation Profile 2 page 24

Following a change in process for coagulation, the Thrombin Time will be **replaced by Fibrinogen**. The sample type and turnaround times remain unchanged.

MICROBIOLOGY: NEW, UPDATES AND CHANGES

UPDATE – Group B Strep using Enriched Culture Medium (ECM) page 26

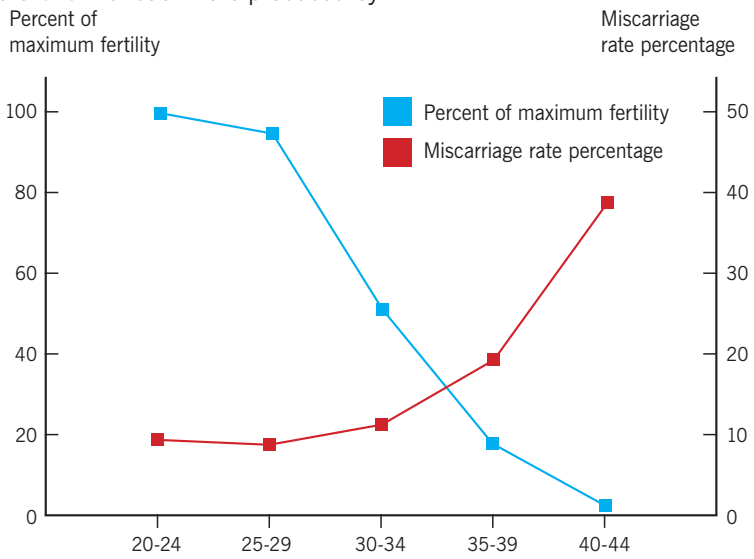
Group B Streptococcus (GBS) is the UK's most common cause of life-threatening infection in newborn babies. It is a normally harmless bacteria carried by around 21% of the population and most babies are not affected by it. However, if a baby becomes infected, one in ten will die of blood poisoning, pneumonia or meningitis, while around one in five are permanently affected by cerebral palsy, blindness, deafness or serious learning difficulties.

The UK National Screening Committee has recently indicated that it will only test for GBS in women considered at high risk, although 4 NHS trusts in the UK now make GBS testing available to pregnant women using the gold standard Enriched Culture Medium (ECM). Conventional culture will fail to identify GBS in approximately 50% of cases. If your patients ask, or you want to recommend Group B Strep testing for them, please take **2 x culture swabs** (lower vagina/lower rectum) at 35-37 weeks, or up to the time of the birth. If positive, the mother needs to be treated with intravenous (not oral) antibiotics as soon as her waters break.

FERTILITY AND ENDOCRINOLOGY: NEW, UPDATES AND CHANGES

UPDATE – Anti-Mullerian Hormone (AMH/Ovarian Function page 28

The measurement of AMH has led to much greater insight into ovarian function. It is produced by small growing follicles thus is distinct from ovulation and is a step closer to be able to assess the true ovarian reserve, measureable from birth to near the menopause – with a peak in the mid-20's. Use of AMH testing is becoming routine in assisted conception practice. It does not vary significantly across the menstrual cycle and this adds to its clinical utility. There is considerable interest, both professional and public, in its ability to predict remaining reproductive lifespan – and this has value in a number of important clinical disciplines, for example post chemotherapy, or ovarian surgery. AMH is also markedly increased in polycystic ovarian syndrome.



Ageing and reproduction in women. From Speroff, 2004.

As with any hormone its interpretation needs to be made in the clinical content and validated age specific normal ranges, quality assurance and standardisation of measurement are required for confidence in interpretation. New automated assays will be developed which will allow for more rapid processing. AMH is important. It reflects a very different aspect of ovarian function to the historically available markers (ie, the sex steroids) and it will lead to considerable advances in our understanding of ovarian function from puberty to the menopause.

PREGNANCY: NEW, UPDATES AND CHANGES

NEW – Non-Invasive Prenatal Testing (NIPT) Screening for chromosome abnormalities page 84

This is an exciting time for prenatal testing. In the last two years studies and data have shown that it is now possible through analysis of cell free DNA in maternal blood to detect with exceptional accuracy for pregnancies with fetal trisomy [Chrs 21, 18 and 13], with a simultaneous reduction in the need for invasive testing to less than 1%. This is as equally effective for low risk and high risk pregnancies.

- NIPT is undertaken from 10 weeks (confirmed by scan)
- Ultrasound scan should be carried out at 12 weeks for detailed examination of the fetal anatomy, nuchal transluscency, nasal bone, blood flow to heart and liver

The outcome of the NIPT and the NT Scan will determine whether a CVS is indicated. The NIPT test does not provide information on physical defects, mosaicism, partial trisomy, translocations or triploidy.

TDL Genetics will provide

• request forms • patient consent form • NIPT specific tubes

For further information, or sample taking packs, please contact TDL Genetics on **020 7307 7409** or **NIPT@tdlpathology.com**.

SEXUAL HEALTH: NEW, UPDATES AND CHANGES

NEW – STD8 for Bacterial Vaginosis page 43

This is a direct specimen DNA probe-based diagnostic test for the differential detection and identification of the causative agents for vaginitis: Candida species, Gardnerella vaginalis and Trichomonas vaginalis. The DNA methodology allows for early identification and treatment of patients with these pathogens. This is more accurate than current microscopic methods for detecting the causative agents of vaginitis and assay performance is not affected by 'difficult specimens', self-medication or the presence of mixed infections.

This test has its own specific swab (not the routine PCR swab) with instructions for sample.

This result will show a reported line for each pathogen:

1. Trichomonas
2. Gardnerella
3. Candida

- Speed of turnaround – as this will be a same or next day result.
- Sensitivity and specificity from DNA testing – stable for 3 days.
- 3 pathogens processed from one BV Swab for one price.
- Ideal for patient self-sampling/home collection, postal pathology.

NO LONGER AVAILABLE

The DRIED BLOOD SPOT for Early Detection of HIV (DBSH) is no longer available – please see TDL TINIES for self/home collection HIV and Sexual Health tests.

NEW – TDLTinies for Remote Testing/Self Collection tinies@tdlpathology.com

The range of tests for Sexual Health Screening now includes serology testing for remote testing/self-taken blood samples (home collection) and postal pathology using TDL TINIES. TDL TINIES (packs with instructions) can be fulfilled by TDL by arrangement or supplied directly to doctors or healthcare companies. This is not point of care testing. All testing is undertaken in the laboratory and results for postal samples are always returned directly to the healthcare company or doctor, not to the patient.

Up to four tests can be taken from one TINY sample

• HIV/p24 Antigen • Hep B sAg • Hep C Abs • Hep C Antigen for early detection •Syphilis IgG/IgM

For information and packs, please contact Annette Wilkinson on **020 7307 7343** or email **tinies@tdlpathology.com**.

IMMUNOLOGY: NEW, UPDATES AND CHANGES

UPDATE – Genetic predisposition in Coeliac Disease page 51

Coeliac Disease (CD) is an immune-mediated disease of the intestines that is triggered by the ingestion of gluten in genetically susceptible individuals. Gluten is the major protein component of wheat, rye, and barley. Genetic predisposition does play a key role in CD, and it is well known that CD is strongly associated with specific HLA class II genes – HLA-DQ2 and HLA-DQ8. Approximately 95% of CD patients express HLA-DQ2, and the remaining patients are usually HLA-DQ8 positive. However, the HLA-DQ2 allele is common and is carried by approximately 30% of Caucasian individuals. Thus, HLA-DQ2 or HLA-DQ8 is necessary for disease development but is not sufficient for disease development; its estimated risk effect is only 36-53%.

TUMOUR MARKERS: NEW, UPDATES AND CHANGES

UPDATE – HE4 for Earlier Detection of Ovarian Cancer page 65-66

Ovarian Cancer affects 7000 women every year in the UK. HE4 shows a higher specificity to ovarian cancer over that of CA12-5 alone. The combination of HE4 and CA12-5 together improves diagnostic sensitivity compared to either marker alone in the detection of ovarian cancer in women with pelvic masses. In addition, 20% of women with ovarian cancer will not have an elevated CA12-5. False positive CA12-5 levels are noted in approximately 25% of women. HE4 together with its partnered CA 12-5 discriminates better between ovarian cancer and benign conditions. It has also been observed that HE4 serum levels become normal following treatment, suggesting that HE4 could be used for the follow up of ovarian cancer.

NEW – EarlyCDT®-LUNG page 65

Lung cancer is the second most common cancer in the UK (2009), accounting for around 13% of all new cancer cases (men 14%, women 11%). Lung cancer incidence rates in Scotland are among the highest in the world, reflecting the country's history of high smoking prevalence. Lung cancer is typically not diagnosed until physical, non-specific symptoms present – usually, shortness of breath, chest, shoulder or back pain or persistent cough.

How many people survive lung cancer?

- The earlier diagnosed the better – the five-year survival rate for early stage is 43-73%, while for later stage disease it is 2-13%[1]
- The five-year survival rates for men and women diagnosed with lung cancer are 7.3% and 8.7% respectively[2]

How many people died from lung cancer in UK in 2008?

- Around 96 people died every day (around 35,000 in 2009)[1]
- The most common cause of cancer death in the UK (more than 20% of all cancer related deaths)[1]

The Oncimmune EarlyCDT®-LUNG is a blood test, measuring a panel of autoantibodies, or markers, to tumour proteins (antigens). The presence of one or more of these autoantibodies provides an early indication of tumour presence. This may be useful for patients with a history of smoking or prolonged exposure to chemicals in the work place. This test detects all types of lung cancer, and whilst it has better positive predictive value performance than CT scans with fewer false positives, it does not replace chest X-ray or CT scans but it may provide earlier signals than imaging alone can provide.

A positive result means that autoantibodies have been detected above a predetermined cut-off and this increased risk may warrant further investigations. **A negative result** does not mean the patient is cancer-free – they are still at high risk for lung cancer from their existing risk factors and regular screening is therefore likely to continue.

EarlyCDT®-LUNG is performed by Oncimmune in the USA. Visit www.earlycdt-lung.co.uk and www.oncimmune.com for further information about this test, and access to publications.

1. Cancer Research UK, www.cancerresearchuk.org 2. National Office for Statistics, www.statistics.gov.uk/default.asp

MOLECULAR/PCR: NEW, UPDATES AND CHANGES

UPDATE – Gastrointestinal Pathogen Panel: Enteric Organism Rapid Detection Bacterial, Viral and Parasitic Infection by Real-Time PCR Multiplex page 55

Winter 2012/2013 – the highly infectious norovirus winter vomiting bug has struck early this year with cases up by about a quarter on the same time last year. For all those confirmed and reported by laboratory testing, there are likely to be hundreds more that have gone unreported. The level in November 2012 has been the highest for 5 years. Cases of rotavirus which has similar symptoms of vomiting and diarrhoea are also up by one third.

This is a qualitative molecular multiplex diarrhoea test intended for the simultaneous detection and identification of multiple gastrointestinal pathogens including bacteria, viruses, and parasites. Because the symptoms from viral, bacterial and parasitic agents are often the same it is often difficult to differentiate them – hence 80% of all cases of diarrhoea are currently unidentified, and antibiotics are often inappropriately used.

Bacteria and bacterial toxins

- *Salmonella*
- *Shigella*
- *Campylobacter*
- *Clostridium difficile* Toxin A/B
- Enterotoxigenic *E. coli*
- *E. coli* O157
- Shiga-like Toxin producing *E. coli*
- *Vibrio cholerae*
- *Yersinia enterocolitica*

Viruses

- Adenovirus 40/41
- Rotavirus A
- Norovirus GI/GII

Parasites

- Giardia
- *Entamoeba histolytica*
- *Cryptosporidum*

This is the first panel available covering 15 major gastrointestinal pathogens in a single test: A separate request is needed for a stool o/c/p and culture.

TDL GENETICS: NEW, UPDATES AND CHANGES

UPDATE – ARRAY CGH Testing page 82

Chromosome abnormalities can be associated with developmental delay, austism spectrum disorder, learning difficulties, dysmorphic features and other congenital abnormalities. Array CGH detects smaller genetic changes than is possible by conventional karyotyping and when applied as a test for appropriate patients, will detect up to three times more pathogenic chromosomes imbalances than karyotyping. This is now considered as the front line test for detecting deletions and duplications with greater sensitivity than conventional karyotyping.

NEW – Prenatal testing using BoBS™ page 83

This is a new, rapid molecular test for Amnio and CVS samples that can detect not only major chromosomal aneupoloides (Chrs 13, 18, 21, X and Y) but also changes to 9 regions of the genome associated with a range of important microdeletions that are not easily found by karyotyping and may remain undetected by ultrasound:

- Angelman Syndrome
- Cri du Chat Syndrome
- DiGeorge 2 Syndrome
- DiGeorge Syndrome
- Langer-Giedion Syndrome
- Miller-Dieker Syndrome
- Prader-Willi Syndrome
- Smith-Magenis Syndrome
- Williams-Beuren Syndrome
- Wolf-Hirschorn Syndrome

Prenatal BoBS is a significant advance over PCR and Karyotyping, and can be carried out as an additional test from either amniotic fluid or CVS samples for significantly enhanced detection of chromosomal defects.

NEW – Non-Invasive Prenatal Testing (NIPT) Screening for chromosomes abnormalities page 84

This is an exciting time for prenatal testing. In the last two years studies and data have shown that it is now possible through analysis of cell free DNA in maternal blood to detect with exceptional accuracy for pregnancies with fetal trisomy [Chrs 21, 18 and 13], with a simultaneous reduction in the need for invasive testing to less than 1%. This is as equally effective for low risk and high risk pregnancies.

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CHANGE – Ashkenazi Jewish Carrier Screening page 86

The screening profile has expanded and now covers 108 common mutations across 24 genes. Ashkenazi Jewish genetic diseases are a group of rare disorders that occur more often in people of Eastern European (Ashkenazi) Jewish heritage than in the general population. About 1 in 4 Ashkenazi Jews are carriers of Gaucher disease, cystic fibrosis, Tay Sachs disease, familial dysautonomia, or Canavan Disease. If two carriers of the same disorder have children, there is a 25% chance of having an affected child, a 50% chance of having a child who is a carrier like themselves, and a 25% chance of having a child who is neither affected nor a carrier.

ALLERGY: NEW, UPDATES AND CHANGES

UPDATE – Allergy Components for Allergists page 97

Allergens are composed of a number of differential potential allergenic molecules that may cause sensitisastion – and IgE testing of these components gives a more precise and detailed picture of a patient's sensitisation pattern.

UPDATE – Immunocap ISAC Panel page 94

This panel allows for simultaneous measurement in a single test of specific antibodies to more than one hundred components for more than 50 preselected allergen sources.

VITAMINS, NUTRITION AND LIFESTYLE: NEW, UPDATES AND CHANGES

NEW – Testing for Telomeres pages 90-91

The attention given to aging related processes has increased steadily in recent years. A recently published paper[1] indicated that the amount spent in the USA on anti-aging agents now equals the amount spent on treatments for chronic conditions. The indications for seven aging related processes that are being treated as medical conditions to be slowed or reversed with medication are urinary symptoms (non infection) mental alertness/memory issues, hormone replacement, insomnia, sexual dysfunction, skin aging and hair loss.

Telomeres are protective DNA-protein complexes at the end of linear chromosomes that promote chromosomal stability. Telomere shortness in human beings is emerging as a prognostic marker of disease risk, progression, and premature mortality in many types of cancer, including breast, prostate, colorectal, bladder, head and neck, lung, and renal cell. Telomere shortening is counteracted by the cellular enzyme telomerase. Lifestyle factors known to promote cancer and cardiovascular disease might also adversely affect telomerase function. When Telomeres are critically short, cells become senescent – unable to divide. Therefore the percentage of short telomeres suggest that they are the most precise indicator of aging and play a central role in the development of age related disease. Lifestyle and nutritional habits, as well as stress, heredity, environmental factors all influence on critically short telomeres and rate of aging. There is compelling evidence that telomere length is heritable. With increasing clinical appreciation of new disease patterns and the availability of genetic testing, defining how telomere biology can inform individualised medicine decisions is likely to become more important.

There is mounting evidence of a causal role for telomere dysfunction in a number of degenerative disorders. Although these disorders seem to be clinically diverse, collectively they comprise a single syndrome spectrum defined by the short telomere defect.

Measuring critically short telomeres and comparing biological age vs chronological age can encourage patients to take healthier decisions that can improve their day to day lives as well as their life-span allowing them to modify habits that accelerate aging and take nutritional/neutraceutical supplements when appropriate under clinical supervision.

Completion of an online anonymised questionnaire is required for this test.

Isolation of Peripheral Blood Mononuclear Cells (PBMC) is undertaken by TDL and samples are shipped frozen at minus (-)80°C for processing by Life Length at The Spanish National Cancer Research Centre, Madrid, Spain.

For further information about Life Length and access to publications please visit www.lifelength.com

1 American Public Health Association APHA 140th Annual Meeting; Abstract 265 – 701 30/10/2012.

The Laboratory Guide is designed to give you an easy-to use reference for the most regularly requested tests and profiles. If you need help or advise in finding details about tests or services, please contact the laboratory on **020 7307 7373**. We continue to develop a wide range of diagnostic services and our aim is to offer commitment to customer service, strong working relationships and help and support to doctors and their practices.

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