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1 PROFILE OF DEPARTMENT

1.1 Vision Statement

To be a group of professionals who provide excellent patient care through education and research, supported by a caring work environment.

1.2 Laboratory Development

We plan to develop the laboratory into one of choice for clinicians and clinical trialists managing Rheumatologic, Allergic and Immunologic disorders in Singapore and the region. We will offer the complete range of investigations that are performed accurately, reliably, and expeditiously at competitive costs. We plan to make the services of our Laboratory available to new, external clients and to expand the range of investigations we can offer, both by acquiring new equipment and, for the more difficult ones, by engaging the services of other laboratories which can perform them.

1.3 Scope

The Clinical Immunology Laboratory (subsequently referred to as CIL in this document) carries out tests that are vital for the management of patients with Rheumatologic, Allergic or Immunologic diseases.

1.4 Research and Development

Our laboratory is primarily meant for service work, but does engage in limited volume of research. We constantly look into our in-house tests, like the analysis for HLA-B27, to improve them. We assist in the collection of sera, plasma and genomic DNA for studies. Clinical researchers also make use of the CIL as a central laboratory for analyzing their study specimen samples.

1.5 Laboratory Relationships

We work very closely and constructively with the Department of Laboratory Medicine (DLM) in our hospital. We have links with the Immunology Laboratory of the Singapore General Hospital especially in terms of exchanging specimen for mutual corroboration.
Certain tests that are neither available in our laboratory nor offered elsewhere in Singapore are sent to the Mayo Medical Laboratories (Rochester, Minnesota) for analysis.

### 1.6 Personnel

Laboratory Director: Dr Leong Khai Pang  
Medical Technologists In-charge: Carol Ng

### 1.7 Training, Education and Development

Training and education is essential for the maintenance and improvement of our services. Therefore, this program is emphasized in the CIL. New staffs undergo structured training in the different sections of our laboratory so that they gain competence in all the tests. Staffs are granted time to attend courses and talks.

### 1.8 Quality Assurance Programs

The quality of our results is under constant surveillance. Results that vary from the expected range with respect to patient population or laboratory norm will be scrutinized and repeated if necessary.

We subscribe to two external audit programs: the National External Quality Assurance Scheme (NEQAS) from UK and College of American Pathologists (CAP) Survey from the USA. Our laboratory has been accredited by the CAP since 2001.

### 2 SPECIMEN COLLECTION AND PREPARATION

Laboratory test results are dependent on the quality of the submitted specimen. It is important that all specimens and request forms be properly labeled with the patient’s name, collection date, and the origin (source) of the specimen, when applicable. Also, they must be collected in the right manner, transported in the correct tubes and stored in the right conditions. These pre-analytic conditions are vital to the analysis work carried out in the laboratory.

If there is doubt or question about the type and method of specimen collection, please contact CIL by telephone (6357-8464) or email to CIL_Enquiry@ttsh.com.sg and we will be happy to assist.
2.1 Specimen Collection

Most laboratory tests are performed on serum, plasma or anti-coagulated whole blood. In general, tubes containing the specimens should be refrigerated until they are ready to be transported to the laboratory in the infectious disease biohazard bags. Please see our individual test directory section for other specific requirements.

2.1.1 Plasma
• Draw a sufficient amount of blood with the indicated anticoagulant to yield the necessary plasma volume. Gently mix the blood collection tube by inverting six to ten times immediately after collection.
• Ideally, plasma should be separated from cells by centrifugation within 20-30 minutes.

2.1.2 Serum
• Draw a sufficient amount of blood to yield the necessary serum volume. Allow blood to clot at room temperature. Separate serum from clot by centrifugation within 20-30 minutes. Haemolysis should be avoided.
• Vigorous mixing, inadequate clotting time for the specimen and high centrifugation speed may cause haemolysis.

2.1.3 Whole Blood
• Draw a sufficient amount of blood with the indicated anticoagulant. Gently mix the blood collection tube by inverting six to ten times immediately after draw.

2.2 Specimen Collection Instruction

When collecting specimens for transportation to CIL, please keep in mind:
• The specimen must be properly identified.
• The patient's name, hospital number or the unique identifier must be clearly written on the specimen container.
• The appropriate test requisition, complete with the patient's name or unique identifier must accompany the specimen.
• Unlabelled or mislabelled specimens will not be tested.

2.3 Specimen Collection Tubes

These tubes are often used to collect specimen for processing in the CIL:

1. Lavender-Top Tube (EDTA)
• This tube contains the anticoagulant EDTA and is used for collecting whole blood.
• In CIL, HLA-B27 and HLA-B57:01 testing requires whole blood collected with this tube.
• After filling the tube with blood, immediately invert it several times in order to prevent coagulation.

2.3.2 Light-Blue-Top Tube (Sodium Citrate)
• This tube contains sodium citrate as an anticoagulant and is used for collecting whole blood.
• In CIL, HLA-B27 and HLA-B57:01 testing requires whole blood collected with this tube.
• Immediately after blood draw, invert the tube six to ten times in order to activate the anticoagulant.

2.3.3 Serum Separator Tube (SST® - Yellow-Top VACUTAINER®)
• This tube contains a clot activator and serum gel separator – used for various laboratory tests on sera.
• Invert the tube to activate the clotting; let stand for 20-30 minutes before centrifuging for 15 minutes. If frozen serum is required, pour off serum into plastic vial and freeze. Do not freeze VACUTAINER® tubes.

2.4 Handling of Specimen

All specimens must be placed in properly labelled containers and transported in an infectious disease biohazard bag. Specimen may be hand-delivered to CIL.

2.4.1 Courier Services

Courier services are available for transporting specimens to CIL from many locations throughout Singapore. Special courier services will be established if appropriate arrangements can be made. For more information, please contact us at the following numbers:
Tel: 6357-8464 Fax: 6357-8463 Email: cil_enquiry@ttsh.com.sg

2.4.2 Turnaround time

This catalog lists the days on which the tests are set up and the amount of time needed to analyse the test sample as an indicator of the turnaround times. Kindly note that repeated tests requires additional time. If the published turnaround times cannot be met by the laboratory, a memo will be send out stating when the result(s) will be available.
The results obtained through telephone (6357-8464) are provisional and may change after final quality assurance validation. Only the hard copy printed on letterhead paper issued by CIL should be regarded as final.

2.4.3 Repeat determinations

We will repeat tests without additional charge to the patient under the following circumstances:
• When we determine that our analytical system has failed quality control;
• If a specimen is lost because of a laboratory accident; or
• When the result does not correlate (in the doctor’s opinion) with the patient’s clinical picture. In such an instance, the doctor should explain the circumstances on the memo accompanying the new specimen.
Follow-up or confirmatory testing is not considered repeat determinations and the lab will charge the patient accordingly.

2.4.4 Storage of specimen

Original blood specimens and sera are kept at 4°C for a week, and analyzed sera are kept at -70°C for 6 months. There might be occasions when it would be necessary to repeat or run additional tests on those samples in storage. To request this, please send an official requisition form with patient’s particulars and the date of blood collected.

2.4.5 Unacceptable specimen

Some specimens cannot be analyzed because of improper collection or degradation in transit. Other specimens may have prolonged turnaround times because of lack of necessary ancillary specimens or patient information.

You will be notified of rejected or problem specimens upon receipt. To avoid specimen rejection, please use the following checklist:

• Are the patient information boxes in the request form correctly, legibly and adequately filled up?
• Has the patient been properly prepared before blood draw? For example, the assays for C1 esterase inhibitor (both antigen and functional) level are performed preferably with fasting blood.
• Is the specimen derived from the correct patient?
• Is the specimen kept in the right container (metal-free, separation gel, sterility, etc)?
• Has the correct specimen type (plasma, serum, whole blood etc) been collected?
• Is the specimen volume sufficient?
• Is the storage temperature (ambient, frozen or refrigerated) appropriate?

2.4.6 Labelling errors

In the case of a major labelling error (e.g. no label, patient data on specimen container does not tally with request form), the laboratory will notify the doctor or the nurse in-charge and the specimen will be discarded and request rejected.

2.4.7 Specimen rejection policy

The quality and appropriateness of the specimen limit accuracy and clinical usefulness of all laboratory analyses. The techniques used for the collection and submission of the specimen can influence the outcome of testing results.

All specimens are subject to rejection if:

• Are of insufficient quantity or quality.
• Are of excessive age for the type of examination requested.
• Are received with either specimen container unlabeled or incomplete test request form or the specimen label not matching the test request form.
• Are leaking and can easily be replaced by recollection.
• Are of incorrect specimen type or condition

2.5 Laboratory Operating Hours

The Laboratory is open as follows:

Monday to Friday : 8.30 am – 5.30 pm
Saturdays, Sundays & Public Holidays : Closed
6. Request Forms

Request forms can be downloaded from https://www.ttsh.com.sg/clinical-immunology-lab/ for your ease of use. Hardcopies can be supplied without charge. Please call us at 6357-8464 to arrange for delivery of forms.
3 ENQUIRIES, CONSULTATIONS AND CANCELLATIONS

3.1 Enquiries

The Medical Technologists of CIL provide technical information; handle general inquiries regarding types of available tests, service hours, and types of supplies available, specimen collection, unacceptable specimens, test results, payment and others.

Telephone: 6357-8464   Facsimile: 6357-8463   Email: cil_enquiry@ttsh.com.sg

3.2 Clinical Consultation

We welcome clinical discussions on the interpretation of tests conducted in the CIL. Requests for interpretation of test results and consultations should be directed to the laboratory consultant:

Dr. Leong Khai Pang   Telephone: 6357-7821   Mobile no: 8126-3240

3.3 Paper Reports

Reports will be sent to the requesting location.

3.4 Test Result Call-Backs

Results will be faxed (or emailed to requesting doctor) to a client when requested.

3.5 Test Cancellation

Physicians occasionally decide that certain tests are not needed after the specimen drawn from the patient has been dispatched. We honour such cancellations at no charge provided the tests have not been set up. Once the analysis has commenced, such requests cannot be accepted. A memorandum containing the patient’s particulars test(s) to be cancelled and doctor’s signature must be sent to CIL within 24 hours after verbal cancellation.

3.6 Corporate Clients
The Finance Department will issue a monthly billing invoice for tests performed in the Laboratory to private medical practitioners, contractual clients and private institutions allied to TTSH.
1. Internal Clients

Doctors practicing in Tan Tock Seng Hospital utilize a different system for test ordering and obtaining patient reports.

4 LIST OF TESTS PERFORMED IN CIL

This is a list of tests currently performed in the CIL. Electronic version can be found on TTSH website: [http://www.ttsh.com.sg/Clinical-Immunology-Lab/](http://www.ttsh.com.sg/Clinical-Immunology-Lab/)

4.1 Connective Tissue Disease and APS Markers

1. **Anti-Nuclear Antibody (ANA)**
   Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
   Method: Indirect Immunofluorescence
   Reference: Normal < 80 Titre
   If positive, results are titred up to 1/640 dilution and patterns indicated.
   Turnaround Time: 1-4 days
   Day(s) Test Set Up: Monday through Friday, Morning

2. **Anti-double stranded DNA Antibody (dsDNA)**
   Specimen Required: Serum (Yellow or Red top)
   Method: Enzyme Linked Immunosorbent Assay (ELISA)
   Reference: Normal < 25 IU/mL
   Turnaround Time: 1-2 days
   Day(s) Test Set Up: Monday through Friday, Morning

3. **Anti-SSA (Ro) Antibody (SSA or Ro)**
   Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
   Method: Enzyme Linked Immunosorbent Assay (ELISA)
   Reference: Normal <20 RU/mL
   Turnaround Time: 1-7 days
   Day(s) Test Set Up: Friday Morning
4. **Anti-SSB (La) Antibody (SSB or La)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Friday Morning

5. **Anti-Smith Antibody (Sm)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Friday Morning

6. **Anti-Ribonucleoprotein Antibody (nRNP)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Friday Morning

7. **Anti-Scl-70 Antibody (Scl-70)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Friday Morning

8. **Anti-Jo-1 Antibody (Jo-1)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)  
Reference: Normal <20 RU/mL  
Turnaround Time: 1-7 days  
Day(s) Test Set Up: Friday Morning

9. **Anti-Cardiolipin IgG Antibody (ACA-IgG)**  
Specimen Required: Serum (Yellow or Red top)  
Method: Enzyme Linked Immunosorbent Assay (ELISA)  
Reference: Normal ≤20 GPL  
Turnaround Time: 1-7 days  
Day(s) Test Set Up: Tuesday Morning

10. **Anti-Cardiolipin IgM Antibody (ACA-IgM)**  
Specimen Required: Serum (Yellow or Red top)  
Method: Enzyme Linked Immunosorbent Assay (ELISA)  
Reference: Normal ≤20 MPL  
Turnaround Time: 1-7 days  
Day(s) Test Set Up: Tuesday Morning

11. **Anti-β2-Glycoprotein-1 (Anti-β2GP1) IgG**  
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)  
Method: Enzyme Linked Immunosorbent Assay (ELISA)  
Reference: Normal <20 RU/mL  
Turnaround Time: 1-7 days  
Day(s) Test Set Up: Tuesday Morning

12. **Myositis Panel (16 Antigens)**  
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)  
Method: Immunoblotting Assay  
Reference: Negative (Reported as positive or negative)  
Individual results for 16 Antigens: Mi-2α, Mi-2β, TIF1γ, MDA5, NXP2, SAE1, Ku, Ro-52, PM-Scl100, PM-Scl75, Jo-1, SRP, PL-7, PL-12, EJ, OJ  
Turnaround Time: 1-7 days  
Day(s) Test Set Up: Monday Afternoon
2. Arthritis Markers

2.1.1. Rheumatoid Factor (RF) IgM
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-3 days
Day(s) Test Set Up: Monday, Wednesday and Friday, Mornings

2.1.2. Anti-CCP (Cyclic Citrullinated Peptide)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 Units
Turnaround Time: 1-4 days
Day(s) Test Set Up: Monday Morning and Thursday Afternoon

2.1.3. Anti-Streptolysin ‘O’ Titre (ASOT)
Specimen Required: Serum (Yellow or Red top)
Method: Latex agglutination Test
Reference: Negative
If positive, results are titred up to extinction
Turnaround Time: 1-3 days
Day(s) Test Set Up: Monday through Friday, Afternoon

2.3. Syphilis Serology

2.3.1. Rapid Plasma Reagin (RPR)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA or Heparin)
Method: Card Particle Agglutination Test
Reference: Non-reactive
If reactive, results are titred up to extinction
Turnaround Time: 1-3 days
Day(s) Test Set Up: Monday through Friday, Afternoon
3. **Syphilis IgG Antibody**

Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)

Method: Enzyme Linked Immunosorbent Assay (ELISA)

Reference: <16 RU/mL - Negative  
≥16 to <22 RU/mL - Borderline  
≥22 RU/mL - Positive

Turnaround Time: 1-4 days

Day(s) Test Set Up: Tuesday and Friday, Afternoon

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### 3.4. Organ Specific Autoimmunity

#### 3.4.1. **Anti-Thyroglobulin Antibody (ATG)**

Specimen Required: Serum (Yellow or Red top)

Method: Enzyme Linked Immunosorbent Assay (ELISA)

Reference: Normal <100 IU/ml

Turnaround Time: 1-7 days

Day(s) Test Set Up: Wednesday Morning

#### 3.4.2. **Anti-Thyroid Peroxidase Antibody (TPO)**

Specimen Required: Serum (Yellow or Red top)

Method: Enzyme Linked Immunosorbent Assay (ELISA)

Reference: Normal <50 IU/mL

Turnaround Time: 1-7 days

Day(s) Test Set Up: Wednesday Morning

#### 3.4.3. **Anti-TSH Receptor Antibody (TRAB)**

Specimen Required: Serum (Yellow or Red top)

Method: Enzyme Linked Immunosorbent Assay (ELISA)

Reference: Normal <1.0 IU/L

Turnaround Time: 1-7 days

Day(s) Test Set Up: Wednesday Morning

#### 3.4.4. **Anti-Smooth Muscle Antibody (SMA)**

Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)

Method: Indirect Immunofluorescence
Reference: Negative
If positive, results are titred up to 1/320 dilution.

Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning
4. **Anti-Mitochondrial Antibody (AMA)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning

4.1.6. **Anti-Liver, Kidney Microsomal Antibody (LKM)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning

4.1.7. **Anti-Islet Cell Antibody (ICA)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Thursday, Afternoon

4.1.8. **Glutamic Acid Decarboxylase Autoantibody (GAD)**
Specimen Required: Serum (Yellow or Red top)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <5 U/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Monday Morning

4.1.9. **Anti-Parietal Cell Antibody (PCA)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning
5. **Anti-Intrinsic Factor Antibody (AIF)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning

5.1.11. **Anti-Skeletal Muscle Antibody (SKA)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning

5.1.12. **Anti-Glomerular Basement Membrane Antibody (GBM)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-3 days
Day(s) Test Set Up: Monday through Friday

5.1.13. **Anti-Endomysial Antibody, IgA (EMA)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning

5.1.14. **Anti-Tissue Transglutaminase Antibody, IgA (TTGA)**
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning
6. Anti-Tissue Transglutaminase Antibody, IgG (TTGG)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: <1.0 Ratio – Negative
≥1.0 to 2.0 Ratio – Weak Positive
≥2.0 to 5.0 Ratio – Positive
≥5.0 – High Positive
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning

6.1.16. Anti-Gliadin Peptides Antibody, IgA (GLPA)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <25 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning

6.1.17. Anti-Gliadin Peptides Antibody, IgG (GLPG)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <25 RU/mL
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning

6.1.18. Anti-Phospholipase A2 Receptor (PLA2R)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: <14 RU/mL – Negative
≥14 to <20 RU/mL – Borderline
≥20 RU/mL – Positive
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning
7. Vasculitis Markers

7.1.1. Anti-Neutrophil Cytoplasmic Antibody (ANCA)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Indirect Immunofluorescence
Reference: Negative
If positive for C-ANCA or P-ANCA, the result will be reported. Anti-Myeloperoxidase Antibody (MPO) & Anti-Proteinase 3 (PR3) antibody will be recommended. Anti-MPO & Anti-PR3 will be quantitated by enzyme-linked immunosorbent assay (ELISA). There will be additional charges for these tests.

NOTE: Not all specimens positive for P-ANCA are positive for Anti-MPO and not all specimens positive for C-ANCA are positive for Anti-PR3 antibody.

Turnaround Time: 1-5 days
Day(s) Test Set Up: Tuesday and Friday, Morning

7.1.2. Anti-Myeloperoxidase Antibody (MPO)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/ml
Turnaround Time: 1-7 days
Day(s) Test Set Up: Monday Morning

7.1.3. Anti-Proteinase 3 Antibody (PR3)
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA, Heparin or Citrate tube)
Method: Enzyme Linked Immunosorbent Assay (ELISA)
Reference: Normal <20 RU/ml
Turnaround Time: 1-7 days
Day(s) Test Set Up: Monday Morning
8. Genotyping

8.1.1. Human Leucocyte Antigen B27 (HLA B27)
Specimen Required: 3 ml Sodium Citrated blood (Light Blue-Top)
Method: Polymerase Chain Reaction (PCR) Using Sequence-Specific Primers
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-7 days
Day(s) Test Set Up: Monday Morning

8.1.2. Human Leucocyte Antigen B57:01 (HLA B57:01)
Specimen Required: 3 ml Sodium Citrated blood (Light Blue-Top)
Method: Polymerase Chain Reaction (PCR) Using Sequence-Specific Primers
Reference: Negative (Reported as positive or negative)
Turnaround Time: 1-7 days
Day(s) Test Set Up: Thursday Morning
9. Allergy Tests

9.1.1. Total IgE, Serum
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA or Heparin tube)
Method: Fluorescent Enzyme Immunoassay (FEIA) using ImmunoCap 100 system
Reference: Normal <113 kU/L (for Adult and children age > 10 years old)

<table>
<thead>
<tr>
<th>Children Age (up to)</th>
<th>Reference Range (kU/L) (Geometric Mean + 2SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 weeks</td>
<td>&lt;4.0</td>
</tr>
<tr>
<td>3 mths</td>
<td>&lt;7.2</td>
</tr>
<tr>
<td>6 mths</td>
<td>&lt;12.8</td>
</tr>
<tr>
<td>9 mths</td>
<td>&lt;17.4</td>
</tr>
<tr>
<td>12 mths</td>
<td>&lt;22.8</td>
</tr>
<tr>
<td>2 years</td>
<td>&lt;40.3</td>
</tr>
<tr>
<td>3 years</td>
<td>&lt;56</td>
</tr>
<tr>
<td>4 years</td>
<td>&lt;70</td>
</tr>
<tr>
<td>5 years</td>
<td>&lt;84</td>
</tr>
<tr>
<td>6 years</td>
<td>&lt;98</td>
</tr>
<tr>
<td>7 years</td>
<td>&lt;110</td>
</tr>
<tr>
<td>8 years</td>
<td>&lt;124</td>
</tr>
<tr>
<td>9 years</td>
<td>&lt;136</td>
</tr>
<tr>
<td>10 years</td>
<td>&lt;148</td>
</tr>
</tbody>
</table>

Turnaround Time: 1-7 days
Day(s) Test Set Up: Wednesday Morning

9.1.2. Tryptase, Serum
Specimen Required: Serum (Yellow or Red top) or plasma (EDTA or Heparin tube).
NOTE: Samples should preferably be taken between 15
minutes and 3 hours after the suspected event causing mast cell activation.

<table>
<thead>
<tr>
<th>Method</th>
<th>Fluorescent Enzyme Immunoassay (FEIA) using ImmunoCap 100 system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>Normal &lt; 11.4 µg/L (for children &gt;4 years and adults)</td>
</tr>
<tr>
<td>Turnaround Time:</td>
<td>1-7 days</td>
</tr>
<tr>
<td>Day(s) Test Set Up:</td>
<td>Wednesday Morning</td>
</tr>
</tbody>
</table>
### 10. Specific IgE Testing

Allergens available:

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Environmental</th>
<th>Insect Venom</th>
<th>Components</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicilloyl G</td>
<td>$D. \ pteronyssinus$ (House dust mite)</td>
<td>Honey Bee</td>
<td>rAra h1 (peanut)</td>
<td>Egg White</td>
</tr>
<tr>
<td>Amoxicilloyl</td>
<td>$Blomia \ tropicalis$ (House dust mite)</td>
<td>Yellow Wasp</td>
<td>rAra h2 (peanut)</td>
<td>Crab</td>
</tr>
<tr>
<td>Penicilloyl V</td>
<td>$D. \ farinae$ (House dust mite)</td>
<td>Paper Wasp</td>
<td>rAra h8 (peanut)</td>
<td>Cod Fish</td>
</tr>
<tr>
<td>Ampicilloyl</td>
<td>Cockroach</td>
<td>Yellow Hornet</td>
<td>rAra h9 (peanut)</td>
<td>Milk</td>
</tr>
</tbody>
</table>

- $D. \ pteronyssinus$
- $Blomia \ tropicalis$
- Dog Dander
- $Aspergillus \ fumigatus$
- Honey Bee
- Yellow Wasp
- White-faced Hornet
- Egg White
- Shrimp
- Cod Fish
- Chicken
- Milk
- Cheese, Cheddar
- Wheat
- Peanut
- Soya Bean
- Sesame
- Chick pea
- Pea
Note: CIL is able to perform tests for allergens not listed here as long as they are available from the manufacturer. Please call 6357-8464 to discuss the availability and price of allergen. The ordering and interpretation of specific IgE tests should be made with careful clinical correlation. They are useful for confirming the allergen specificity in patients with clinically documented allergic disease. They may be less effective when used for screening.

Specimen Required: Serum (Yellow or Red top) or plasma (EDTA or Heparin tube)
Method: Fluorescent Enzyme Immunoassay (FEIA) using ImmunoCap 100 System

- Beef
- Macadamia Nut
- Pine Nut
- Tree Nuts (Almond, Cashew, Pecan, Brazil, Pistachio, Hazel, Walnut)
Reference: | Class | Interpretation |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Equivocal</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Strongly positive</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Strongly positive</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Strongly positive</td>
</tr>
</tbody>
</table>

**NOTE:** Results will also be reported in kU/L

Turnaround Time: 1-7 days
Day(s) Test Set Up: Wednesday Morning

5. REFERRED TEST LISTING

This is a list of tests sent to Mayo Medical Laboratories. More informations can be found on Mayo Medical Laboratories website: [http://www.mayomedicallaboratories.com/test-catalog/index.html](http://www.mayomedicallaboratories.com/test-catalog/index.html) Reports will be dispatched to the requesting doctors as soon as CIL receives the results.

1. **C1 Esterase Inhibitor, Functional Assay**

   Specimen Required: Serum (Yellow or Red top) preferably from a fasting patient.
   (12 hour preferred)

   Method: Enzyme Immunoassay (EIA)

   Reference: >67% normal (normal)
   41 – 67% normal (equivocal)
   <41% normal (abnormal)

   Turnaround Time: 3-10 days
   Day(s) Test Send-out: Tuesday Morning

2. **C1 Esterase Inhibitor Antigen, Serum**

   Specimen Required: Serum (Yellow or Red top) preferably from a fasting patient.
   (12 hour preferred)

   Method: Nephelometry

   Reference: 19 – 37 mg/dL

   Turnaround Time: 3-10 days
   Day(s) Test Send-out: Tuesday Morning
2. **Angiotensin Converting Enzyme, Serum**

Specimen Required: Serum (Yellow or Red top)

**NOTE:** The use of angiotensin-converting enzyme (ACE)–inhibiting antihypertensive drugs will cause decreased ACE values.

Method: Spectrophotometry (SP)
Reference: 8 – 53 U/L (for adults ≥18 years)
Turnaround Time: 3-10 days
Day(s) Test Send-out: Tuesday Morning

2.4. **IgG Subclasses, Serum**

Specimen Required: Serum (Yellow or Red top)
Method: Nephelometry
Reference:

<table>
<thead>
<tr>
<th>Age</th>
<th>TOTAL IgG</th>
<th>IgG subclass 1</th>
<th>IgG subclass 2</th>
<th>IgG subclass 3</th>
<th>IgG subclass 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to &lt;5 months</td>
<td>100-334</td>
<td>56-215</td>
<td>≤82</td>
<td>7.6-82.3</td>
<td>≤19.8</td>
</tr>
<tr>
<td>5 to &lt;9 months</td>
<td>164-588</td>
<td>102-369</td>
<td>≤89</td>
<td>11.9-74.0</td>
<td>≤20.8</td>
</tr>
<tr>
<td>9 to &lt;15 months</td>
<td>246-904</td>
<td>160-562</td>
<td>24-98</td>
<td>17.3-63.7</td>
<td>≤22.0</td>
</tr>
<tr>
<td>15 to &lt;24 months</td>
<td>313-1170</td>
<td>209-724</td>
<td>35-105</td>
<td>21.9-55.0</td>
<td>≤23.0</td>
</tr>
<tr>
<td>2 to &lt;4 years</td>
<td>295-1156</td>
<td>158-721</td>
<td>39-176</td>
<td>17.0-84.7</td>
<td>0.4-49.1</td>
</tr>
<tr>
<td>4 to &lt;7 years</td>
<td>386-1470</td>
<td>209-902</td>
<td>44-316</td>
<td>10.8-94.9</td>
<td>0.8-81.9</td>
</tr>
<tr>
<td>7 to &lt;10 years</td>
<td>462-1682</td>
<td>253-1019</td>
<td>54-435</td>
<td>8.5-102.6</td>
<td>1.0-108.7</td>
</tr>
<tr>
<td>10 to &lt;13 years</td>
<td>503-1719</td>
<td>280-1030</td>
<td>66-502</td>
<td>11.5-105.3</td>
<td>1.0-121.9</td>
</tr>
<tr>
<td>13 to &lt;16 years</td>
<td>509-1580</td>
<td>289-934</td>
<td>82-516</td>
<td>20.0-103.2</td>
<td>0.7-121.7</td>
</tr>
<tr>
<td>16 to &lt;18 years</td>
<td>487-1327</td>
<td>283-772</td>
<td>98-486</td>
<td>31.3-97.6</td>
<td>0.3-111.0</td>
</tr>
<tr>
<td>≥18 years</td>
<td>767-1590</td>
<td>341-894</td>
<td>171-632</td>
<td>18.4-106.0</td>
<td>2.4-121.0</td>
</tr>
</tbody>
</table>

Turnaround Time: 3-10 days
Day(s) Test Send-out: Tuesday Morning