MANUAL FOR the COLLECTION AND HANDLING OF SPECIMENS

DATE REVISED:  
September 2006
September 2007
July 2008
August 2010
May 2012
July 2012
August 2013 (reviewed)
August 2014 (reviewed)
July 2016 (revised)
August 2018 (reviewed)
1. Allergy Testing Panels (Regional Allergy Panel, Phadia Panels) and Individual Allergens (Specific IgEs)
2. Bronchoalveolar Lavage
3. Granulocyte Respiratory Burst
4. HLA –B27
5. Immunoglobulin E (Total IgE)
6. Leukemia Immunophenotyping Profile
7. Lymphocyte Enumeration, T Cell: CD4, CD8
8. Lymphocyte Enumeration, T, B and NK Subsets
9. Lymphoma Immunophenotyping Profile
10. Myeloperoxidase Staining
11. PNH (Paroxysmal Nocturnal Hemoglobinuria)
12. Sezary Panel
13. Stem Cell Enumeration Assay
Hackensack University Medical Center
Special Diagnostic Immunology Laboratory
551-996-4965

Specimen Requirements
ALLERGY TESTING PANELS and INDIVIDUAL ALLERGENS
(Specific IgE, formerly RAST)

CPT Codes: 82785, 86003, 86005

Component: Method:
Allergen Specific IgE UniCap Fluoroenzyme Immunoassay

Specimen Requirements – Adult:
4 ml serum; A minimum of 0.1 ml of serum is required per allergen. Transport: ambient (room), refrigerated, frozen.

Specimen Requirements – Pediatric:
2 ml serum; A minimum of 0.1 ml of serum is required per allergen. Transport: ambient (room), refrigerated, frozen.

Specimens must be labeled with patient name, medical record number or accession number, date of birth and date and time of procurement.

Turnaround Time: 1-3 days

Set-up Schedule: Monday thru Friday, 8:30 AM – 5:30 PM

Notes: Refer to the list of individual allergens. Call the Special Diagnostic Immunology Laboratory for assistance at 551-996-4965.

Reference Ranges:

<table>
<thead>
<tr>
<th>Concentration (kUA/l)</th>
<th>Class</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35</td>
<td>0</td>
<td>Negative</td>
</tr>
<tr>
<td>0.35 – 0.69</td>
<td>1</td>
<td>Equivocal</td>
</tr>
<tr>
<td>0.70 – 3.49</td>
<td>2</td>
<td>Positive</td>
</tr>
<tr>
<td>3.50 – 17.49</td>
<td>3</td>
<td>Positive</td>
</tr>
<tr>
<td>17.5 – 49</td>
<td>4</td>
<td>Strongly Positive</td>
</tr>
<tr>
<td>50.0 – 99</td>
<td>5</td>
<td>Strongly Positive</td>
</tr>
<tr>
<td>&gt;100</td>
<td>6</td>
<td>Strongly Positive</td>
</tr>
</tbody>
</table>
**ALLERGY PANELS**

The physician is encouraged to order clinically relevant individual allergens if any of the components of the following panels are not relevant. *Please see the lists of individual allergens following the panels.*

1. **REGIONAL ALLERGY PANEL** *(Cerner pneumonic: REG ALLERG)*

This clinician-designed panel reflects the predominant allergens in the Northern New Jersey area. In general, it assists clinicians in the exploration of allergenic triggers in persons with atopic diseases such as rhinitis, conjunctivitis and asthma. There are 19 components to the Regional Allergy Panel, as well as a Total IgE assay performed.

- Alternaria alternate \((m6)\)
- Aspergillus fumigatus \((m3)\)
- Birch \((t3)\)
- Box-elder/Maple \((t1)\)
- Cat \((e1)\)
- Cladosporium herbarum \((m2)\)
- Cockroach \((i6)\)
- Dermatophagoides farinae \((d2)\)
- Dog \((e2)\)
- Elm \((t8)\)
- Epicoccum \((m14)\)
- Lamb’s quarters/Goosefoot \((w10)\)
- Meadow grass/Kentucky blue \((g8)\)
- Mugwort \((w6)\)
- Oak \((t7)\)
- Plantain (English) \((w9)\)
- Ragweed \((w1)\)
- Sheep sorrel \((w18)\)
- White Ash \((t15)\)

2. **RESPIRATORY DISEASE PROFILE** *(Cerner pneumonic: RESP PROF)*

A commercially-suggested panel used to evaluate for allergen sensitivity in persons with respiratory disease. There are 16 components to the Respiratory Disease Profile, as well as a Total IgE assay performed.

- Cat dander \((e1)\)
- Cockroach \((i6)\)
Cocksfoot, Orchard grass

**RESPIRATORY DISEASE PROFILE (RESP PROF) cont’d:**

<table>
<thead>
<tr>
<th>Common Ragweed</th>
<th>(w1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Silver Birch</td>
<td>(t3)</td>
</tr>
<tr>
<td>Dog dander</td>
<td>(e5)</td>
</tr>
<tr>
<td>Elm</td>
<td>(t8)</td>
</tr>
<tr>
<td>Goosefoot, Lamb’s quarters</td>
<td>(w10)</td>
</tr>
<tr>
<td>House dust mite (D. farinae)</td>
<td>(d2)</td>
</tr>
<tr>
<td>House dust mite (D. pteronyssinus)</td>
<td>(d1)</td>
</tr>
<tr>
<td>Maple, Box-elder</td>
<td>(t1)</td>
</tr>
<tr>
<td>Mold (Cladosporium herbarum)</td>
<td>(m2)</td>
</tr>
<tr>
<td>Mold (Alternaria alternata)</td>
<td>(m6)</td>
</tr>
<tr>
<td>Mold (Aspergillus fumigatus)</td>
<td>(m3)</td>
</tr>
<tr>
<td>Oak</td>
<td>(t7)</td>
</tr>
<tr>
<td>White Ash</td>
<td>(t15)</td>
</tr>
<tr>
<td>Total IgE</td>
<td></td>
</tr>
</tbody>
</table>

**3. CHILDHOOD ALLERGY MARCH PROFILE (Cerner pneumonic: CHLD MARCH)**

A commercially-suggested panel used to evaluate allergen sensitivity in atopic children. There are 11 components to the Childhood Allergy March Profile, as well as a Total IgE assay performed.

<table>
<thead>
<tr>
<th>Cat dander</th>
<th>(e1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cockroach</td>
<td>(i6)</td>
</tr>
<tr>
<td>Dog dander</td>
<td>(e5)</td>
</tr>
<tr>
<td>Egg white</td>
<td>(f1)</td>
</tr>
<tr>
<td>Fish, cod</td>
<td>(f3)</td>
</tr>
<tr>
<td>House dust mite (D. pteronyssinus)</td>
<td>(d2)</td>
</tr>
<tr>
<td>Milk</td>
<td>(f2)</td>
</tr>
<tr>
<td>Mold (A. alternata)</td>
<td>(m6)</td>
</tr>
<tr>
<td>Peanut</td>
<td>(f13)</td>
</tr>
<tr>
<td>Soybean</td>
<td>(f14)</td>
</tr>
<tr>
<td>Wheat</td>
<td>(f4)</td>
</tr>
<tr>
<td>Total IgE</td>
<td></td>
</tr>
</tbody>
</table>
4. **FOOD ALLERGY PROFILE** (Cerner pneumonic: **FOOD PROF**)

A commercially-suggested panel used to evaluate persons with food hypersensitivity, anaphylaxis or atopic dermatitis. There are 11 components to the Food Allergy Profile, as well as a Total IgE assay performed.

- Clam (f207)
- Corn (Maize) (f8)
- Egg white (f1)
- Fish, cod (f3)
- Milk (f2)
- Peanut (f13)
- Scallop (f338)
- Shrimp (f24)
- Soybean (f14)
- Walnut (f256)
- Wheat (f4)
- Total IgE

**SPECIFIC IgE – INDIVIDUAL ALLERGENS**

The assay for Specific IgE is offered for a wide variety of allergens, using the Phadia UniCap fluoroenzyme immunoassay.

**Please consult the following lists for specific allergens.**

If other allergens are desired and not listed below, please contact the Special Diagnostic Immunology Laboratory at **551-996-4965** for availability. Please indicate individual allergens on the requisition form.

*Note* 0.1 ml serum is required per individual allergen.
### In-House Allergens

#### Trees
- American Beech (t5)
- Ash (t15)
- Birch, Common Silver (t3)
- Box Elder (t1)
- Cottonwood (t14)
- Elm (t8)
- Grey Alder (t2)
- Hazel (t4)
- Italian, funeral Cypress (t23)
- Japanese Cedar (t17)
- Linden (t208)
- Maple Leaf (t11)
- Mountain Juniper (t6)
- Mulberry (t70)
- Oak (t7)
- Pecan, Hickory (t22)
- Walnut (t10)
- White Pine (t16)

#### Weeds
- Cocklebur (w13)
- Common Pigweed (w14)
- Common Ragweed (w1)
- Dandelion (w8)
- English Plantain (w9)
- Giant Ragweed (w3)
- Goldenrod (w12)
- Lamb’s quarters (w10)
- Mugwort (w6)
- Nettle (w20)
- Rough Marshelder (w16)
- Saltwort/Russian Thistle (w11)
- Sheep Sorrel (w18)
- Western Ragweed (w2)

#### Grasses
- Bermuda Grass (g2)
- Canary Grass (g71)
- Cockfoot (g3)
- Common Reed (g7)
- Johnson Grass (g10)
- Kentucky Blue (g8)
- Meadow fescue (g4)
- Red top (g9)
- Rye (g5)
- Sweet Vernal Grass (g1)
- Timothy (g6)
- Velvet Grass (g13)

### Non-Seasonal Inhalants (In-House)

#### Animal Epidermal
- Budgerigar Droppings (e77)
- Budgerigar Feathers (e78)
- Canary Feathers (e201)
- Cat Dander (e1)
- Chicken Feathers (e85)
- Dog Dander (e5)
- Dog Epithelium (e2)
- Duck Feathers (e86)
- Goose Feathers (e70)
- Guinea Pig Epithelium (e6)
- Hamster Epithelium (e84)
- Horse Dander (e3)
- Mouse Epithelium (e71)
- Mouse Serum Proteins (e76)
- Mouse Urine Proteins (e72)
- Parrot Feathers (e213)
- Pigeon Droppings (e7)
- Rabbit Epithelium (e82)
- Rat Epithelium (e73)
- Rat Serum Proteins (e75)
- Rat Urine Proteins (e74)
- Turkey Feathers (e89)

*Goose, Chicken, Duck, Turkey feathers (ex71)

#### Molds
- Alternaria alternate (A. tenuis) (m6)
- Aspergillus fumigatus (m3)
- Aspergillus niger (m207)
- Aureobasidium pullulans (m12)
- Candida albicans (m5)
- Cladosporium herbarum (m2)
- Curvularia lunata (m16)
- Epicoccum Purpurascens (m14)
- Fusarium moniliforme (m9)
- Helminthosporium halodes (m8)
- Malassezia furfur (m70)
- Mucor racemosus (m4)
- Penicillium notatum (m1)
- Rhizopus nigricans (m11)
- Stemphylium botryosum (m10)
- Trichophyton rubrum (m205)
### Dust Mites/House Dust
- Dermatophagoides farina (d2)
- Dermatophagoides pteronyssinus (d1)
- House dust (Greer Labs, Inc.) (h1)
- House dust (Hollister-Stier Labs) (h2)

### Insect Venom Allergens
- Honey Bee (i1)
- Hornet, White Face (i2)
- Hornet, Yellow (i5)
- Wasp, Paper (i4)
- Yellow Jacket (i3)

### Insects
- Cockroach (i6)
- Fire Ant (i70)
- Horse Fly (i201)
- Mosquito (i71)

### Occupational Allergens
- Green Coffee Beans (k70)
- Ispaghula (k72)
- Latex (k82)
- Sunflower Seed (k84)

### Drugs
- Amoxicilloyl (c6)
- Ampicilloyl (c5)
- Gelatin (c74)
- Insulin, Human (c73)
- Penicilloyl G (c1)
- Penicilloyl V (c2)
**Foods**

**Dairy/Eggs**
- Casein (f78)
- Cheese (cheddar) (f81)
- Cheese (mold type) (f82)
- Egg (whole) (f245)
- Egg white (f1)
- Egg yolk (f75)
- Gluten (f79)
- Milk (cow’s) (f2)

**Grains**
- Barley (f6)
- Oat (f7)
- Rice (f9)
- Rye (f5)
- Wheat (f4)

**Fish**
- Chub Mackerel (f50)
- Cod (f3)
- Herring (f205)
- Salmon (f41)
- Sardine (f61)
- Trout (f204)
- Tuna (f40)

**Crustaceans/Mollusks**
- Blue Mussel (f37)
- Clam (f207)
- Crab (f23)
- Lobster (f80)
- Oyster (f290)
- Scallop (f338)
- Shrimp (f24)

**Herbs/Spices**
- Garlic (f47)
- Mustard (f89)
- Paprika (f218)
- Parsley (f86)
- Pepper (black) (f280)
### Fruits/Vegetables

<table>
<thead>
<tr>
<th>Fruit/Vegetable</th>
<th>%</th>
<th>Fruit/Vegetable</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>(f49)</td>
<td>Apricot</td>
<td>(f237)</td>
</tr>
<tr>
<td>Avocado</td>
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<td>Banana</td>
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<tr>
<td>Broccoli</td>
<td>(f260)</td>
<td>Cabbage</td>
<td>(f216)</td>
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<tr>
<td>Carrot</td>
<td>(f31)</td>
<td>Celery</td>
<td>(f85)</td>
</tr>
<tr>
<td>Cherry</td>
<td>(f242)</td>
<td>Corn</td>
<td>(f8)</td>
</tr>
<tr>
<td>Cucumber</td>
<td>(f244)</td>
<td>Grape</td>
<td>(f259)</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>(f209)</td>
<td>Kiwi</td>
<td>(f84)</td>
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<tr>
<td>Lemon</td>
<td>(f208)</td>
<td>Melon</td>
<td>(f87)</td>
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<tr>
<td>Onion</td>
<td>(f48)</td>
<td>Orange</td>
<td>(f33)</td>
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<td>Peach</td>
<td>(f95)</td>
<td>Pear</td>
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<tr>
<td>Pineapple</td>
<td>(f210)</td>
<td>Plum</td>
<td>(f255)</td>
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<tr>
<td>Potato (Sweet)</td>
<td>(f54)</td>
<td>Potato</td>
<td>(f35)</td>
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<tr>
<td>Soybean</td>
<td>(f14)</td>
<td>Spinach</td>
<td>(f214)</td>
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<tr>
<td>Tomato</td>
<td>(f25)</td>
<td>Strawberry</td>
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### Other

<table>
<thead>
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<tbody>
<tr>
<td>Chocolate</td>
<td>(f93)</td>
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<tr>
<td>Ovalbumin</td>
<td>(f232)</td>
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<tr>
<td>White Bean</td>
<td>(f15)</td>
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<tr>
<td>Yeast</td>
<td>(f45)</td>
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### Nuts/Seeds

<table>
<thead>
<tr>
<th>Nuts/Seeds</th>
<th>%</th>
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<tbody>
<tr>
<td>Almond</td>
<td>(f20)</td>
</tr>
<tr>
<td>Brazil nut</td>
<td>(f18)</td>
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<tr>
<td>Cashew</td>
<td>(f202)</td>
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<tr>
<td>Chestnut</td>
<td>(f299)</td>
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<tr>
<td>Coconut</td>
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<tr>
<td>Hazelnut</td>
<td>(f17)</td>
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<tr>
<td>Peanut</td>
<td>(f13)</td>
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<tr>
<td>Pecan</td>
<td>(f201)</td>
</tr>
<tr>
<td>Pistachio</td>
<td>(f203)</td>
</tr>
<tr>
<td>Sesame seed</td>
<td>(f10)</td>
</tr>
<tr>
<td>Walnut</td>
<td>(f256)</td>
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</table>

### Mammal/Fowl

<table>
<thead>
<tr>
<th>Mammal/Fowl</th>
<th>%</th>
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<tbody>
<tr>
<td>Beef</td>
<td>(f27)</td>
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<tr>
<td>Chicken</td>
<td>(f83)</td>
</tr>
<tr>
<td>Mutton</td>
<td>(f88)</td>
</tr>
<tr>
<td>Pork</td>
<td>(f26)</td>
</tr>
<tr>
<td>Turkey</td>
<td>(f284)</td>
</tr>
</tbody>
</table>
Allergens for Send-Out to ARUP Labs

Acacia
Alpha-Amylase
American Cheese
Anchovy
Bahia Grass
Barley Grass
Basil
Black Bean
Blackberry
Blackeyed Pea
Blueberry
Blue Cheese
Brome Grass
Brussel Sprouts
Botrytis Cinerea
Buckwheat
Budgerigar Serum proteins
Bumble Bee
Cantaloupe
Castor Bean
Catfish
Cauliflower
Cayenne Pepper
Cephalosporin
Chestnut Tree
Chickory Root
Chili Pepper
Chinchilla
Chloramin
Chymopapain
Cilantro
Cinnamon
Clove
Cockroach, American
Coffee
Common Reed Grass
Coriander
Cotton Seed
Cow Epithelium
Cranberry
Cultivated Oat Grass
Cultivated Wheat Grass
Date
Deer Fly
Duck Meat
Allergens for Send-Out to ARUP Labs cont’d

Eel
Eggplant
Ethylene Oxide
Eucalyptus
False Ragweed
Fennel Seed
Ferret Epithelium
Ficus Spp
Firebush, Kochia
Flaxseed
Flounder
Formaldehyde
Fruit Fly
Ginger
Goat’s Milk
Golden Rod
Green Olive
Green Pepper
Guava
Haddock
Halibut
Hickory White
Honey
Honeymelon
Hops
Horseradish
Isocyanate HDI
Isocyanate MDI
Isocyanate TDI
Jalapeño Pepper
Kidney Bean, Red
Lamb Meat
Lima Bean
Lime
Macadamia Nut
Maize, corn (Grass)
Marguerite, Ox-eye Daisy
Meadow Foxtail
Melaleuca
Mint
Mozzarella Cheese
Mushroom
Nectarine
Nutmeg
Oregano
Papaya
Parietaria Judaica
Parietaria Officinalis
Parmesan Cheese
Allergens for Send-Out to ARUP Labs cont’d

Parsnip
Passion Fruit
Phoma Betae
Pine Nut
Pomegranate
Poppy Seed
Queen Palm
Quinolones
Rabbit Meat
Rapeseed
Raspberry
Red Cedar
Red Maple
Red Pepper
Rhubarb
Romano Cheese
Sage
Scale, Lens
Silk Waste
Sole
Spruce Tree
Squash
String Bean
Sulfamethoxazol
Swiss Cheese
Swordfish
Tangerine
Tapioca
Tarragon
Tea
Tetracycline
Thyme
Tilapia
Tricoderma Viride
Trimellitic Anhydride
Turnip
Vanilla Bean
Watermelon
Whey
Whitefish
Wild Rye Grass
Wormwood
Wool Sheep
Zucchini
Specimen Requirements

**BRONCHOALVEOLAR LAVAGE –**  Please see Lymphoma Profile requirements
Specimen Requirements

GRANULOCYTE RESPIRATORY BURST

CPT Code: 88184

Components: Method:
Flow Cytometry

Stimulation Index: Measurement of rhodamine fluorescence after the oxidation from 123 dihydrorhodamine upon stimulation of granulocytes with phorbol myristate acetate (PMA).

*Note: This assay must be scheduled in advance with the Special Diagnostic Immunology Laboratory at 551-996-4965.

Specimen requirements:

Adult: Minimum of 6.0 ml of peripheral blood collected in one plastic lithium heparin anticoagulant vacutainer tube.

Pediatric: Minimum of 4.0 ml of peripheral blood collected in one plastic lithium heparin anticoagulant vacutainer tube.

Notes: 1. Plastic lithium heparin tubes are available through the Special Diagnostic Immunology Laboratory, 551-996-4965.

2. Normal control specimen must be obtained at the same time patient specimen is obtained. Please call the Special Diagnostic Immunology Laboratory for handling and mailing instructions.

3. Results from a CBC with differential, drawn at the same time as the lithium heparin tubes, should be provided with the sample. Alternatively, send an additional purple top tube for CBC with differential to be performed in Pathology.
Granulocyte Respiratory Burst Specimen Requirements cont’d

Specimen Transport: Specimens must not be subject to temperature extremes; they must be transported at room temperature.
Specimens must be received within 24 hours of procurement.
Specimens must be labeled with patient’s name, medical record number or accession number, date of birth, and date and time of procurement.

Set-up Schedule: Monday – Friday, 8:30 AM – 5:30 PM Not available on weekends.

Normal Range: A stimulation index range of 40 - 177, or fluorescence pattern that parallels normal control.

Note: Abnormal results will automatically reflex to Myeloperoxidase staining, for an additional charge (CPT Code 88184).
Specimen Requirements

HUMAN LEUKOCYTE ANTIGEN – HLA-B27 TYPING

CPT Code: 88184

Components:

Method: Flow Cytometry

Specimen requirements – Adult: 10 ml Whole blood; (yellow top tube) ACD Solution B of trisodium citrate, 13.2 g/L; citric acid, 4.8 g/L; and dextrose 14.7 g/L, 0.4 mL.

Specimen requirements – Pediatric: 3 ml Whole blood; (yellow top tube) ACD Solution B of trisodium citrate, 13.2 g/L; citric acid, 4.8 g/L; and dextrose 14.7 g/L, 0.4 mL.

Collection Notes: Do not refrigerate or freeze. Transport at room temperature. Include race and patient’s diagnosis.

Specimens will be rejected if determined to be subject to temperature extremes, clotted, hemolysed or agglutinated.

Specimens will be rejected if received greater than 24 hours past draw time.

Specimens must be labeled with patient’s name, medical record number or accession number, date of birth and date and time of procurement.

Set-up Schedule: Monday – Friday, 8:30AM – 5:30PM

Turnaround Time: 1 day

Reference Values: HLA-B27 percent positive:

African-American, 3-4%
Caucasian, 6-8%
Asian, 1%
Specimen Requirements

**IMMUNOGLOBULIN E (TOTAL IgE)**

**CPT Code:** 82785

**Component:**

**Method:** UniCap Fluoroenzyme Immunoassay

**Specimen Requirements – Adult:**
1 ml serum; A minimum of 0.1 ml of serum is required. Transport: ambient (room), refrigerated or frozen.

**Specimen Requirements – Pediatric:**
1 ml serum; A minimum of 0.1 ml of serum is required. Transport: ambient (room), refrigerated or frozen.

Specimens must be labeled with patient’s name, medical record number or accession number, date of birth and date and time of procurement.

**Turnaround Time:** 1-3 days

**Set-up Schedule:** Monday – Friday, 8:30 AM – 5:30 PM

**Reference Range:** 0 to 233 kU/L
Specimen Requirements

LEUKEMIA IMMUNOPHENOTYPING PROFILE

CPT Code: 88184, 88185

Components:

Includes flow cytometric analysis with a panel of lymphocyte- and/or myeloid-associated surface markers. The appropriate panel chosen is based on clinical information, specimen type, cellular characteristics, and morphologic review.

Method: Flow Cytometry

Pathology consultation (CPT 88325)

Specimen requirements:

**Bone Marrow:**
A minimum of 1-2 ml. collected aseptically in a syringe containing heparin. Bone marrow may also be collected in a sodium heparin vacutainer tube.

**Peripheral Blood:**
A minimum of one sodium heparin tube (10 ml). EDTA tube may suffice if specimen is less than 30 hours old.

Bone marrow and/or peripheral blood smear prepared on glass slide should accompany the specimen.

Collection Notes:

All specimens must be transported at room temperature.

Indicate name and telephone number of the ordering physician and brief history, including cytologic and morphologic characteristics to obtain fully relevant consultation.

Specimens must not be subject to temperature extremes, clotted, hemolyzed or agglutinated.

Specimens must be received within 12 hours or procurement.

Specimens must be labeled with specimen source, patient’s name, medical record number or accession number, date of birth, and date and time of procurement in the presence of the patient (for e.g. bedside).

Turnaround Time: 1-4 days
Results released by hematopathologist after morphologic review.
**Leukemia Immunophenotyping Specimen Requirements cont’d**

**Set-up Schedule:**
Monday – Friday, 8:30 AM – 5:30 PM
Please call **551-996-4965** for night and weekend STAT specimens.

**Normal Values:**
Cell phenotype and cell scatter characteristics consistent with multilineage maturation, without an elevated uniform blast population.

**Leukemia Monoclonal Antibody List:**

<table>
<thead>
<tr>
<th>T Cells</th>
<th>B Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD1a</td>
<td>CD5 (B cell subset)</td>
</tr>
<tr>
<td>CD2</td>
<td>CD19</td>
</tr>
<tr>
<td>CD3</td>
<td>CD20</td>
</tr>
<tr>
<td>CD4</td>
<td>CD22</td>
</tr>
<tr>
<td>CD5</td>
<td>CD23</td>
</tr>
<tr>
<td>CD7</td>
<td>FMC7</td>
</tr>
<tr>
<td>CD8</td>
<td>Kappa Light Chains</td>
</tr>
<tr>
<td>T-Cell receptor (alpha/beta)</td>
<td>Lambda Light Chains</td>
</tr>
<tr>
<td>T-Cell receptor (gamma/delta)</td>
<td>IgA, IgD, IgG, IgM Heavy Chains</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Myeloid / Monocytes</th>
<th>NK Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD13 Myeloid cells</td>
<td>CD56</td>
</tr>
<tr>
<td>CD14 Monocytes</td>
<td></td>
</tr>
<tr>
<td>CD15 Granulocyte associated antigen</td>
<td></td>
</tr>
<tr>
<td>CD16 Fe Gamma receptor III</td>
<td></td>
</tr>
<tr>
<td>CD33 Myeloid cells</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plasma Cells</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD38</td>
<td>CD41 Platelet glycoprotein IIb / IIIa</td>
</tr>
<tr>
<td>CD138 Plasma cells</td>
<td>CD42b Platelet glycoprotein Ib</td>
</tr>
<tr>
<td>CD28</td>
<td>CD61 Platelet glycoprotein IIIa</td>
</tr>
<tr>
<td>CD27</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Miscellaneous</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD10 CALLA</td>
<td>CD79a B Lymphocytes</td>
</tr>
<tr>
<td>CD11b C3bi receptor</td>
<td>CD117 Myeloid blasts</td>
</tr>
<tr>
<td>CD11c Protein 150, 95 (HCL)</td>
<td>CD24 Myeloid cells</td>
</tr>
<tr>
<td>CD25 Interleukin 2 receptor (HCL)</td>
<td>CD64 Myeloid cells</td>
</tr>
<tr>
<td>CD30 Ki-1 Antigen</td>
<td>CD52 T cells</td>
</tr>
<tr>
<td>CD34 Hematopoietic progenitor cells</td>
<td>Myeloperoxidase</td>
</tr>
<tr>
<td>HLA-DR</td>
<td>Terminal Deoxynucleotidyl Transferase (TdT)</td>
</tr>
<tr>
<td>CD71 Transferrin receptor</td>
<td>CD123</td>
</tr>
<tr>
<td>CD103 Mucosal lymphocyte antigen (HCL)</td>
<td>CD66c</td>
</tr>
<tr>
<td>Bcl-2</td>
<td>CD58</td>
</tr>
<tr>
<td>Glycophorin-A Red blood cells</td>
<td>CD200</td>
</tr>
</tbody>
</table>
Specimen Requirements

**LYMPHOCYTE ENUMERATION, T CELL**

**CPT Code:** 86359, 86360

**Components:**

- Absolute CD3 Calculation
- Absolute CD4 Calculation
- Absolute CD8 Calculation
- % CD3+ (mature T cells) Flow cytometry
- % CD3+CD4+ (Helper/inducer) Flow cytometry
- % CD3+CD8+ (Cytotoxic/suppressor) Flow cytometry
- CD4:CD8 ratio Calculation
- WBC with Differential (required) See Hematology

**Method:**

**Specimen requirements – Adult:**

- 5.0 ml (minimum 2.0 ml) Whole blood (EDTA)
- Ambient (room) temperature

**Specimen requirements – Child:**

- 1 – 3 ml Whole blood (EDTA)
- Ambient (room) temperature

**Collection Notes:**

- Do not refrigerate or freeze. Transport at room temperature.
- *Specimens collected in 10ml EDTA tubes (large lavender) will be rejected.

**Specimen Rejection:**

- Specimens must not be subject to temperature extremes, clotted, hemolysed or agglutinated.

- Specimens must be received within 30 hours of collection.

- Specimens must be labeled with patient’s name, medical record number or accession number, date of birth and date and time or procurement.

**Set-up Schedule:**

- Monday – Friday, 8:30AM – 5:30PM
- Not available on weekends.

**Turnaround Time:**

- 1 day

**Reference Range:**

- Age-appropriate reference ranges are supplied with results.
Specimen Requirements

LYMPHOCYTE ENUMERATION, T, B and NK SUBSETS

CPT Code: 86359, 86360, 86064, 86379

Components:

- Absolute CD3
- Absolute CD4
- Absolute CD8
- Absolute CD19
- Absolute CD56
- % CD3 (mature T cells)
- % CD3+CD4+ (Helper/inducer T cells)
- % CD3+CD8+ (Cytotoxic/suppressor)
- % CD3-CD19+ (earliest B cells)
- % CD3-CD56+ (Natural killer cells)
- CD4:CD8 ratio
- WBC + Differential (required)

Method:

- Calculation
- Flow cytometry
- See Hematology

Patient Preparation: None

Specimen Requirements – Adult:

- 5.0 ml (minimum 2.0 ml) Whole blood (EDTA)
- Ambient (room) temperature

Specimen Requirements – Child:

- 1 ml – 3 ml Whole blood (EDTA)
- Ambient (room) temperature

Collection Notes:

- Do not refrigerate or freeze. Transport at room temperature.
- *Specimens collected in 10ml EDTA tubes (large lavender) will be rejected.
- Specimens must not be subject to temperature extremes, clotted, hemolyzed or agglutinated.

- Specimens must be received within 30 hours of collection.
- Specimens must be labeled with patient’s name, medical record number and/or accession number, date of birth and date and time or procurement.

Set-up Schedule:

- Monday – Friday, 8:30 AM – 5:30 PM
- Not available on weekends

Turnaround Time: 1 day

Reference Range:

- Age-appropriate reference ranges are supplied with results.
Specimen Requirements

LYMPHOMA IMMUNOPHENOTYPING PROFILE

CPT Code: 88184, 88185

Components:
Includes flow cytometric analysis with a panel of lymphocyte-associated surfacemarker. The appropriate panel chosen is based on clinical information, specimen type, cellular characteristics, and morphologic review.

Method: Flow Cytometry

This test includes review of pathologic findings with correlation of the flow cytometric analysis. Pathology consultation (CPT Code 88325)

Specimen requirements:

**Biopsy Tissue:**
1 cm³ of tissue in a screw-capped sterile container, with 15 ml of transport media (media supplied by Special Diagnostic Immunology Laboratory).

**Fluids from Serous Effusions:**
The volume of fluid necessary to phenotype the lymphocytes or blasts in serous effusions depends on the specimen cell count. Usually, 20 ml of pleural or peritoneal fluid is sufficient. Smaller volumes may be used if there is a high cell count. If possible, fluids other than spinal fluid should be anticoagulated with heparin.

**CSF (Cerebrospinal Fluid):**
CSF samples should contain 10 ml.

**Fine Needle Aspirations:**
FNAs obtained in syringe with RPMI transport media. Aspirate should be transferred from syringe into sterile plastic collection tubes.

**Bone Marrow:**
A minimum of 1 – 2 ml collected aseptically in syringe containing heparin. Bone marrow may also be collected in sodium heparin vacutainer tube.

**Peripheral Blood:**
A minimum of 4 ml peripheral blood collected in sodium heparin tube. *EDTA tube (5 ml) may suffice if specimen is less than 30 hours old.
Lymphoma Immunophenotyping Specimen requirements cont’d

**Bronchoalveolar Lavage:**
A minimum of 50 ml. in sterile container marked “Bronchial lavage specimen”.
**Recommended:** 5 ml whole blood collected in EDTA tube at room temperature for a peripheral blood B&T cell Lymphocyte Enumeration.
A peripheral WBC count and differential obtained at time of bronchoscopy.

**Note**: Specimens must be received within 12 hours of collection.

**Collection Notes:**
Specimens requiring surgical pathology diagnosis and flow cytometric analysis should be sent fresh, directly to Surgical Pathology on saline-soaked gauze placed in a sterile container. The pathologist will separate an adequate sample for flow cytometric analysis.

Specimens requiring only flow cytometry should be sent as per surgeon orders for biopsy procedures. Sterile specimen tube containing RPMI 1640 media with 25 mM Hepes buffer with L-glutamine should be readily available.
Contact the Special Diagnostic Immunology Laboratory at 551-996-4965 with any questions.

All biopsy tissue specimens must be completely immersed in 10% FCS in 1640 RPMI transport media. The biopsy specimen must be delivered immediately to the Special Diagnostic Immunology Laboratory.

**Do not refrigerate or freeze.** Promptly forward at ambient temperature

Indicate name and telephone number of the ordering physician and brief patient history (new diagnosis, relapse, previously treated lymphoma etc).

Specimens must be labeled with specimen source, patient’s name, medical record number or accession number, date of birth, and date and time of procurement in the presence of the patient (“bedside”).

Specimens must be received within 12 hours of procurement.

**Note**: Specimens immersed in formalin (even if briefly) will not be processed.

**Turnaround Time:**
1 – 2 days

**Set-up schedule:**
Monday – Friday, 8:30 AM – 5:30 PM
Please call 551-996-4965 for night and weekend specimens.
Normal Range: **No detectable monoclonal population**, with lymphocyte subsets in expected proportions. **No aberrant loss or aberrant expression of surface markers.**

**Lymphoma Monoclonal Antibody List:**

**T Cells:**
- CD1a
- CD2
- CD3
- CD4
- CD5
- CD7
- CD8
- T-cell receptor (alpha / beta)
- T-cell receptor (gamma / delta)

**B Cells:**
- CD5 (B cell subset)
- CD19
- CD20
- CD22
- CD23
- FMC7

**NK Cells**
- CD56

**Leukocytes**
- CD45

**Plasma Cells**
- CD38
- CD138 plasma cells
- CD28
- CD27

**Miscellaneous:**
- CD10  CALLA
- CD11c  Protein 150, 95 (HCL)
- CD25  Interleukin 2 receptor (HCL)
- CD30  Ki-1 Antigen
- CD33  Myeloid marker
- CD34  Precursor cells
- CD34  Precursor cells
- CD34  Precursor cells
- CD71  Transferrin receptor
- CD103 Mucosal lymphocyte antigen (HCL)
- CD103 Mucosal lymphocyte antigen (HCL)
- BCL-2
- HLA-DR
- CD79
- CD43
Specimen Requirements

**MYELOPEROXIDASE STAINING**

**CPT Code:** 88184, or 88185 (reflex)

**Method:** Flow Cytometry

**Intracellular myeloperoxidase staining by monoclonal antibody**

**Bone Marrow:**
A minimum of 1-2 ml bone marrow collected in aseptic syringe containing heparin. Bone marrow may also be collected in sodium heparin vacutainer tube.

**Peripheral Blood:**
A minimum of 4 ml of peripheral blood collected in EDTA or sodium heparin tube.

A bone marrow and/or blood smear prepared on a glass slide should accompany bone marrow specimen.

**Collection Notes:**
All specimens must be transported at room temperature and arrive immediately after procurement.

Specimens must not be subject to temperature extremes, clotted, hemolyzed or agglutinated.

Specimens must be labeled with specimen source, patient’s name, medical record number and/or accession number, date of birth and date and time of procurement.

**Turnaround Time:** 1-2 days

**Set-up Schedule:** Monday – Friday, 8:30 AM – 5:30 PM

**Normal Values:** Positive in granulocytes, monocytes (dim) and myeloblasts.

**Note:** This test is also reflexed from leukemia immunophenotyping profile (CPT Code 88184, 88185), or from a defective granulocyte respiratory burst test.
**Specimen Requirements**

**PNH (PAROXYSMAL NOCTURNAL HEMOglobinuria)**

**CPT Code:** 88184, 88185 (x3)

**Components:** Method:

PNH Flow cytometry

**Specimen requirements:**

**Peripheral Blood:**

A minimum of 4 ml. of peripheral blood in sodium heparin tube.

**Collection Notes:**

All specimens must be transported at room temperature and arrive within one hour of procurement.

Specimens must not be subject to temperature extremes, clotted, hemolyzed or agglutinated.

Specimens must be labeled with specimen source, patient’s name, medical record number or accession number, date of birth, and date and time of procurement.

**Turnaround Time:** 1 – 2 days

**Set-up Schedule:**

Monday – Friday, 8:30 AM – 5:30 PM

Please call 551-996-4965 for night and weekend STAT specimens.

**Normal Value:** Expression of CD55 and CD59 on all granulocytes and all red blood cells.

**PNH Antibody List:**

CD55 Granulocytes / RBCs
CD59 Granulocytes / RBCs
Specimen Requirements

**SEZARY PANEL**

**CPT Code:** 88184, 88185 (x5)

**Components:**

<table>
<thead>
<tr>
<th>%CD3</th>
<th>(Mature T cells)</th>
</tr>
</thead>
<tbody>
<tr>
<td>%CD3+4+</td>
<td>(Helper/Inducer)</td>
</tr>
<tr>
<td>%CD3+8+</td>
<td>(Cytotoxic/Suppressor)</td>
</tr>
<tr>
<td>%CD4+7-</td>
<td>(Sezary cell subset)</td>
</tr>
<tr>
<td>%CD7+</td>
<td>(Pan T cells)</td>
</tr>
</tbody>
</table>

**Method:**

<table>
<thead>
<tr>
<th>%CD3</th>
<th>Flow cytometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>%CD3+4+</td>
<td>Flow cytometry</td>
</tr>
<tr>
<td>%CD3+8+</td>
<td>Flow cytometry</td>
</tr>
<tr>
<td>%CD4+7-</td>
<td>Flow cytometry</td>
</tr>
<tr>
<td>%CD7+</td>
<td>Flow cytometry</td>
</tr>
<tr>
<td>CD4/CD8</td>
<td>Calculation</td>
</tr>
</tbody>
</table>

**Patient preparation:** None

**Specimen requirements – Adult:**

- 5.0 ml (minimum 2.0 ml) whole blood (EDTA)
- 10.0 ml (minimum 5.0 ml) whole blood (Sodium heparin), if specimen greater than 30 hours old.

Ambient (room) temperature.

**Specimen requirements – Child:**

- 1-3 ml whole blood (EDTA)

**Collection Notes:**

**Do not refrigerate or freeze.** Transport at room temperature.

Specimens must not be subject to temperature extremes, clotted, hemolyzed or agglutinated.

Specimens should be received in the lab within 30 hours of collection.

Specimens must be labeled with patient’s name, medical record number and/or accession number, date of birth, and date and time of procurement.

**Set-up Schedule:**

Monday – Friday, 8:30 AM - 5:30 PM

Not available on weekends

**Turnaround Time:** 1 – 2 days

**Reference Range:**

A CD4+CD7- lymphocyte subset in normal individuals comprises less than 10.8% of the total lymphocytes.
STEM CELL ENUMERATION ASSAY

CPT Code: 86587

Components:
- Absolute CD34
- % CD34
- % Viability
- CBC with differential

Methods:
- Flow cytometry

Specimen Requirements:
Depending on the patient’s protocol, any of the following specimen types are acceptable.
- **Peripheral Blood**: one 10 ml EDTA tube
- **Pheresis product**: one EDTA tube (minimum 2 ml)
- **Cord Blood**: one EDTA tube (minimum 2 ml)
- **Bone Marrow**: a minimum of 1 – 2 ml collected aseptically in syringe containing heparin. Bone marrow may also be collected in sodium heparin vacutainer tube.

One EDTA tube (3 ml) for the WBC and differential.

Collection Notes:
All blood samples **must be transported at room temperature**.

All specimens must not be subject to temperature extremes, clotted, hemolyzed or agglutinated.

Specimens must be received within 16 hours of procurement.

Specimens must be labeled with specimen source, patient’s name, medical record number and/or accession number, date of birth, and date and time of procurement.

Turnaround Time: 1 day

Set-up Schedule: Monday – Friday, 8:30 AM – 5:30 PM
Please call **551-996-4965** for night and weekend STAT specimens.

Reference Range: Not applicable