Specimen Collection and Preparation

The quality of any laboratory is dependent upon proper collection and handling of the specimen. The tube recommendations for blood drawing should be followed precisely otherwise the results may be seriously affected. Specific requirements for each test determination are included with the individual test listing. The required specimen amount should be submitted. A safe rule to use, when possible, is to obtain a volume of blood equal to 2 1/2 times the amount of plasma or serum needed.

Temperatures for storage and transportation are also critical and usually separated among the following categories:

- Ambient: 15° C to 35° C
- Refrigerate: 2° C to 8° C
- Frozen: <-1° C but preferably ≤-20° C

Animal Specimens

This testing is offered on a limited basis. Please contact your customer service representative for further information.

Collecting the Specimen

Please submit the specified specimen and the correct volume. All specimens should be refrigerated unless otherwise indicated. Serum and plasma specimens should be sent in plastic transport tubes or red-top tubes if not frozen. If a fasting specimen is indicated, there should be no food intake for 12 to 14 hours prior to testing. All specimens submitted must be properly identified. Date and time of collection must be indicated on the requisition form.
See "Tube Types" in "General Information" for tube identification.

- *Plasma*: Draw plasma using 1 of the following tubes:
  - —Citrated plasma - blue-top tube(s)
  - —EDTA plasma - lavender-top tube(s)
  - —Heparin plasma - green-top tube(s)
- *Serum*: Draw serum using serum gel tube(s). Use of a barrier tube will provide the most accurate results. Allow tube to clot for 30 minutes and centrifuge for 10 minutes. It is very important to centrifuge within 45 minutes of venipuncture.
- *Whole Blood*: Draw blood using 1 of the following anticoagulants.
  - —Clotted whole blood - red-top tube without serum separator
  - —EDTA - lavender-top tube(s)
  - —Heparin - green-top tube(s)
  - —Sodium citrate - blue-top tube(s)

Gently mix blood collection tube by inverting 8 to 10 times immediately after draw to prevent coagulation.

Microbiology Specimens

Microbiology specimen collection and transport are important for rapid and accurate identification of microorganisms. Sterile containers are available from the laboratory and must be used for all cultures. Various culture tubes are available upon request. Whenever possible, specimens should be collected before administration of antibiotics. Urine specimens should be refrigerated if transport to the laboratory is more than 30 minutes.

Health and Safety Precautions

All specimens should be handled using the Universal Precautions Principles (ie, handled as if they are infectious). Any additional information that client furnishes in regard to characteristics of the specimen that would provide extra protection to handlers and testing personnel is welcomed. All specimens should be properly sealed prior to transportation and packaged to prevent any potential leak. **No sharp object or needle should be sent with specimens.** Glass slides should be packed properly and should be easily removable from protective containers.

Improperly Labeled/Unlabeled Specimens

In order to assure the most accurate laboratory results possible for patients, SWRL follows standards set forth by the College of American Pathologists (CAP) and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Among these standards, are the JCAHO National Patient Safety Goals.

Because of this, Scott & White's Department of Pathology policy states that an unlabeled or improperly labeled specimen **will not be returned** to originating location. It must be recollected to assure best possible patient care.

Any questions related to these matters should be directed to SWRL at 800-792-3369.

Patient Preparation

Consult alphabetical test listing for specific directions for test orders. When known, interfering medications or foods are listed in the test requirements. Fasting means no food or drink, except water, for 12 to 14 hours. Water and medications are allowed unless specifically prohibited by test requirements or physician's order.

Specimen Collection Tubes

The following is a list of tubes referred to in Scott & White's specimen requirements:

- *Plain, Red-Top Tube*: Does not contain an additive of any kind. Used for serum determinations in chemistry, immunology, and HLA.
- *Red Serum gel Tube with Gray Speckled Top*: Contains a clot and gel for serum separation for serum determinations.
  Note: Invert tube at least 5 times to ensure adequate mixing.
- *Royal Blue-Top (Metal) Tube*: Check tube carefully, contains 1 of the following:
  —Sodium heparin
  _ Sodium EDTA (Na_2 EDTA)
  —None
  Note: 1. For trace elements, toxicology and nutrient determinations.
  2. Invert tube at least 8 times to ensure adequate mixing.
  3. Only sodium heparin is acceptable for cytogenetic cultures.
- *Green-Top (Heparin) Tube*: Check tube carefully, contains one of the following:
  —Sodium heparin (note restrictions below)
  —Lithium heparin (note restrictions below)
  —Ammonium heparin
  Note: 1. Invert tube at least 8 times to ensure adequate mixing.
  2. Only sodium heparin is acceptable for immunology testing.
  3. Only sodium heparin is acceptable for cytogenetic cultures.
  4. Lithium heparin is suitable for most chemistry assays, but **not** lithium drug levels.
  5. Only sodium heparin is acceptable for flow cytometry.
- *Lavender-Top (EDTA) Tube*: Check tube carefully, contains 1 of the following:
  —Liquid K_3 EDTA
  —Freeze-dried Na_2 EDTA
  —Silicone-coated liquid EDTA
  Note: 1. Use the silicone-coated liquid EDTA only for ACTH specimens.
  2. For whole blood hematology determinations. use a 3 mL tube.
  3. Invert tube at least 8 times to ensure adequate mixing. May be used for Blood Bank testing.
- *Light Blue-Top (Sodium Citrate) Tube*: Check tube carefully, contains 105 M sodium citrate (3.2%). For coagulation determinations on plasma specimens.
  Note: Invert tube at least 8 times to ensure adequate mixing. It is important tubes are allowed to fill to specified volume.
- *Yellow-Top (ACD-Solution A) Tube*: Contains acid citrate dextrose solution A. For whole blood immunology determinations.
  Note: 1. The tube must be filled completely. Invert tube at least 8 times to ensure adequate mixing.
  2. Use only when sodium heparin tubes are unavailable.
  3. Used for HLA (histocompatibility) testing.
- *Pink-Top (K3 EDTA) Tube*: Used for Blood Bank testing.

Specimen Labeling

All specimens must be thoroughly identified. Complete labeling should include:

- Patient's full name, (first, last, and middle initial_
- Medical record number or request form peel-of number
- Date and time of collection
- Initials of collector

All slides must be labeled with:

- Patient's last name and first initial (at minimum)
- Identification number
- Date of collection

Specimen Rejection Criteria

These criteria apply to unsatisfactory specimens submitted for testing and will cause rejection of the specimen. Generally, specimens received by a laboratory are not discarded until physician ordering the test or responsible nursing station is notified. Conditions, which will result in rejection of specimens, include but are not limited to:

- Specimen improperly collected or preserved
- Specimen submitted without properly completed information
- Specimen volume not sufficient for requirement of test protocol
- Outside of container contaminated by specimen (ie infectious hazard)
- Patient not properly prepared for test specimen requirements
- Specimen not submitted in proper container

Surgical Pathology

Containers with preservative for pathology specimens and supplies for cervical/vaginal cytology will be supplied. A brief history and identification of biopsy site should be included with request form.

Tubes

Tube Type and Color		
Anticoagulant	**Inner Ring Color**	**Cap Color**
Serum tube/clot activator	Black	Red
Serum tube/gel activator	Yellow	Red
Lithium heparin	Black	Green
Gel and lithium heparin	Yellow	Green
Sodium heparin	Black	Green
Sodium citrate	Black	Light blue
EDTA	Black	Lavender
Sodium fluoride	Black	Grey
ACD-B	Black	Yellow
ACD-A	Black	Yellow
Sodium citrate	Black	Black
EDTA (Blood Bank)	Black	Pink
Sodium heparin	Black	Royal blue
Note: All tubes with white inner rings are Pedi draws only.		

Tube-Stopper Color	Type of Additive
Red stopper	No additive (BD)
Red black stopper	Clot activator (Greiner)
Red yellow stopper	Clot activator (Greiner) Serum separator gel (SST)
Grey stopper	Potassium oxalate/sodium fluoride
Green stopper	Sodium or lithium heparin
Light blue stopper	Sodium citrate
Lavender stopper	Liquid K_2 EDTA
Yellow stopper	Acid citrate dextrose (BD)
Royal blue stopper	May have EDTA **or** no additive
Pink stopper	EDTA (Greiner)

Tube-Stopper Color	Most Common Laboratory Use
Red-stopper	Chemistry & serology
Red-black stopper	Chemistry & serology
Red-yellow stopper	Chemistry & serology
Grey stopper	Lactic Acid
Green stopper	Chemistry or STAT chemistry
Light blue stopper	PT, PTT, coagulation
Lavender stopper	Hematology (CBC and sedimentation rate) two 3-mL tubes Blood Bank (3-mL tube) pediatric patients *May also be substituted for pink stopper when drawing adult patients Special Chemistry HgB A, C and electrophoresis
Yellow stopper	DNA paternity testing
Royal blue with EDTA	Lead and zinc
Royal blue - No additive	Copper
Pink stopper	Universal color for Blood Bank

Tube Types and Order of Draw
Blue-top (citrate) - tubes must be a full draw - 2 mL and 3 mL: fill to black mark on left side of label PT/PTT Protime (PT) aPTT (PTT) Fibrinogen (FIB) D-Dimer (D-DI) Thrombin time (TT) Fibrin monomer (FM) FSP or FDP
Serum gel tube (no anticoagulant) - 8 mL: most chemistries Glucose BUN Creatine Comprehensive metabolic profile (CMP) E-Group (electrolytes) Pregnancy TSH Lipid profile TIBC/Iron Drug levels: acetaminophen, carbamazepine, digoxin, ethanol, gentamicin, lithium, phenobarbital, phenytoin, salicylate theophylline, tobramycin, vancomycin
Green-top (lithium heparin [green-top with yellow + gel]) Ammonia (on ice) Cardiac enzymes Creatine Kinase (CK) MB Mass (CKMB) Troponin I Green-top (sodium heparin [green-top with black-no gel]) Immune survey Leukocyte alkaline phosphatase stain (LAP) Chromosome studies
Lavender-top (EDTA) 3 mL CBC B-Type natriuretic peptide (BNP) Platelets Reticulocyte count Sedimentation rate Sickle cell screen
Pink-top (EDTA) 6 mL Type and crossmatch Type and screen First tube filled in Trauma Alert/Red blanket Red-top tube or serum gel tube is not acceptable.
Grey-top (sodium fluoride/potassium oxalate) 2 mL Lactic acid (on ice)
To prevent clotting, tubes must be gently inverted 8 to 10 times immediately after being drawn. After 4 to 5 inversions, the serum gel tube should begin to clot.
Note: If a tube is not a full draw, add-ons may not be possible.

Order of Draw
Note: When a butterfly is used, the first tube will underfill. Therefore, a discard tube is filled first, then the rest of the tubes in the series.
Tube 1: Blood culture bottles/Isolator® tubes
Tube 2: Light blue-top (sodium citrate) tube (coagulation testing)
Tube 3: Serum tube with or without clot activator, with or without gel
Tube 4: Green-top (heparin) tube
Tube 5: Lavender-top (EDTA) tube
Tube 6: Grey-top (sodium fluoride/potassium oxalate) tube
Tube 7: Yellow-top (ACD) tube