



Virtual Laboratories in a Clinical Laboratory Sciences Program

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Clinical Laboratory Sciences

- Clinical Chemistry
- Microbiology
- Urinalysis
- Transfusion Medicine
- Hematology
- Hemostasis



Clinical Laboratory Sciences




University of Minnesota's Clinical Laboratory Sciences' Student Laboratory (Minneapolis)




University of Minnesota's Clinical Laboratory Sciences' Student Laboratory (Rochester)




University of Minnesota Medical Center's Acute Care Laboratory





Student Laboratory Method

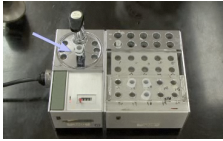


Clinical Laboratory Method



Teaching CLS Students

1. New instrumentation has made testing a “black box”
2. Difficult to repair very old instruments previously used in student laboratories
3. Students still need to understand the principles involved



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Hemostasis – Blood Coagulation


Hemostasis Online Modules

- Background information
- Links to pdfs of laboratory worksheets
- Interactive laboratory quality control
- Videos for controls and patient samples

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Prothrombin Time Virtual Lab

Start

Center for Allied Health Programs


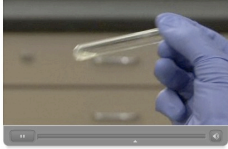
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Prothrombin Time

2. Virtual Lab Sections | About

Prothrombin Time Tests

<p>Control - normal</p> <ul style="list-style-type: none"> • Trial 1 • Trial 2 • Trial 3 <p>Normal Plasma</p> <ul style="list-style-type: none"> • Trial 1 • Trial 2 • Trial 3 <p>Unknown Plasma 1</p> <ul style="list-style-type: none"> • Trial 1 • Trial 2 • Trial 3 	<p>Control - abnormal</p> <ul style="list-style-type: none"> • Trial 1 • Trial 2 • Trial 3 <p>Abnormal Plasma</p> <ul style="list-style-type: none"> • Trial 1 • Trial 2 • Trial 3 <p>Unknown Plasma 2</p> <ul style="list-style-type: none"> • Trial 1 • Trial 2 • Trial 3 	 <p style="font-size: x-small;">Click the stopwatch to start, stop, and restart timing.</p> 
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1. Run each test by clicking its link (run the Controls first).
2. Start (click) the stopwatch when the plasma has been pipeted into the thromboplastin-CaCl₂ (there is a prompt in the video).
3. Stop (click) the stopwatch as soon as you see a clot form in the video.
4. Record the time on your worksheet.

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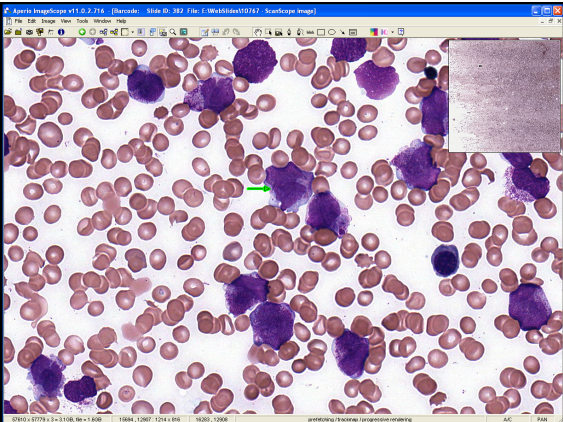
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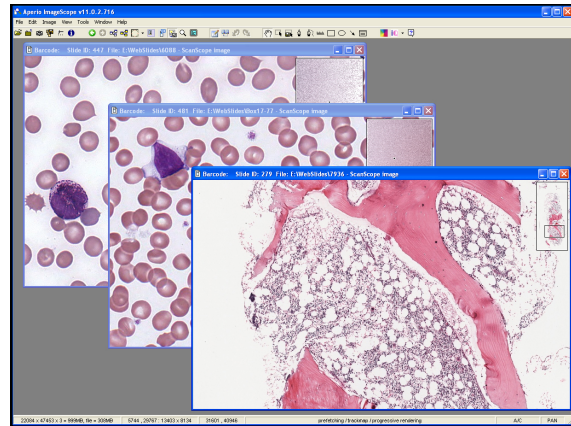
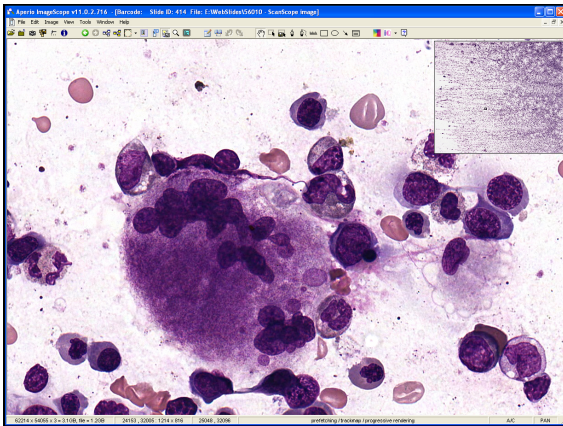
Hematology

1. Hematology I – traditional wet laboratory exercises, students learn basic skills
2. Advanced Hematology – Laboratory exercises replaced by online slides and online, synchronous session with faculty

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Screenshot of a web browser showing a virtual microscope interface. The main area displays a high-magnification view of a blood smear with a green arrow pointing to a specific white blood cell. The browser's address bar and various toolbars are visible at the top.



Transfusion Medicine

- **Antibody Identification Module**
- Students get immediate feedback for each step of the antibody identification

Blood Transfusion Antibody Typing

Our 20-year-old patient Sarah Decker has had chronic renal disease and requires dialysis three times per week. Because of kidney disease and anemia, she is dependent on transfusion of whole blood, packed red cells. She has numerous transfusions and has a positive antibody screen. An antibody ID reaction to the PEG adsorbed panel is screening test is shown below. She was not transfused for months before this blood sample for antibody detection and typing.

Antigen	Screening Test	Identification Panel
Rh-Pr	+	+
Rh-CE	+	+
Rh-E	+	+
Rh-F	+	+
Rh-V	+	+
MNSs	+	+
P	+	+
Lewis	+	+
Lutheran	+	+
Keil	+	+
Duffy	+	+
Kidd	+	+
Xg	+	+
Panel Results	+	+

A panel of red cells was screened by being with Sarah Decker's sample, again using PEG as the enhancement medium. This panel is shown in the last page, which you will bring to the reading lab session.

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Blood Transfusion Antibody Typing

3. Case 2 | Sections | About

PATIENT NAME: Sarah Decker
PATIENT ID: 100000
RHD: O, Rh: D
History: Anemia due to the disease
Blood Transfusion
Center: 1000

Step 1. Rule out each antigen IN ORDER, left to right, top to bottom.
Then click **DONE** below when complete.

Lot No. (P250)	Exp. Date (MM/YY)	Rh-Hr	MNSs	P	Lewis	Lutheran	Keil	Duffy	Kidd	Xg	Patient Results
1	R1R1	+	+	+	+	+	+	+	+	+	- 2+ 1
2	R1R1	+	+	+	+	+	+	+	+	+	- 2+ 2
3	R1R1	+	+	+	+	+	+	+	+	+	- 2+ 3
4	R1	+	+	+	+	+	+	+	+	+	- 2+ 4
5	R1	+	+	+	+	+	+	+	+	+	- 1+ 5
6	R2R2	+	+	+	+	+	+	+	+	+	- 2+ 6
7	R2R2	+	+	+	+	+	+	+	+	+	- 2+ 7
8	R1	+	+	+	+	+	+	+	+	+	- 2+ 8
9	R1	+	+	+	+	+	+	+	+	+	- 2+ 9
10	R1	+	+	+	+	+	+	+	+	+	- 2+ 10
AC	Auto Ctrl	-	-	-	-	-	-	-	-	-	- 2+ AC

Incorrect: M cannot be ruled out because the antigen is present in the heterozygous state (M+N+).

DONE

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Summary

- Laboratory exercises designed to teach students the skills and information they need to know
- Once skills have been developed, additional exercises are delivered in an online format

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