I. **Announcements**
No lab today! Break for exam week! Next R Blood Chemistry. Thanks sincerely for helping us optimize safety by reading ≥ 2x Lab 5, LM pp 5-1 thru 5-6.

II. **Blood Form & Function**

A. Formed vs Nonformed/cells vs plasma LS fig + tab 11-1
   Cell origin - bone marrow. What’s in plasma? LS p 297
B. Red blood cells/erythrocytes: $O_2$ carrying LS p 299
   Normal flexible vs fragile sickle cell LS p 301
C. White blood cells/leukocytes: defense/immunity
differential + general functions LS pp 298, 309-12
D. Platelets/thrombocytes: clotting LS pp 304-6 fig 11-6+7

III. **Blood Chemistry Lab: Basics**

A. What’s blood typing? ABo System LS pp 302- 4
   Rhesus factor? Erythroblastosis fetalis? LS p 303-4
B. What’s blood glucose? Clinically healthy range?
C. Diabetes + Treatment LS ch 17 pp 532-5

IV. **Exam Comments & Return**

We survived the exam! Happy Halloween!! Remember nutrient ρ & have safe fun!
What's in Blood? Plasma & Blood Cells

Plasma (55% of whole blood)

Buffy coat: platelets and leukocytes (<1% of whole blood)

Erythrocytes (45% of whole blood)

- Platelets
- Leukocytes (white blood cells)
- Erythrocytes (red blood cells)
Red blood cells on hypodermic needle

~ 8μ
Red blood cells trapped by fibrin clot
What a difference one amino acid can make!

Amino acid sequence of normal hemoglobin:
Val → His → Leu → Thr → Pro → Glu → Glu

Amino acid sequence of sickle-cell hemoglobin:
Val → His → Leu → Thr → Pro → Val → Glu
White blood cells false feet to entrap E. coli bacterium

10,000 x GMBH
Nat Geog 1986
White blood cells
endocytosis of E. coli
Pseudopods or false feet to ensnare E. coli

6000 x GMBH Nat Geog 1986
B cell lymphocyte producing antibodies, E. coli nearby
Histamine erupting from mast cells
Avelolar macrophage (mature monocyte) attempting to digest asbestos

3000 x GMBH
Nat Geog 1986
Rhinovirus 14 attacking wbc
HIV attacking T-helper cell lymphocyte, commander-in-chief of the immune system
HIV structure

- Protein capsule (capsid)
- Glycoprotein (GP120)
- Glycoprotein (GP41)
- RNA
- Viral core
- Viral envelope
Dr. Louis Picker of OHSU on track to cure HIV!


https://www.youtube.com/watch?v=ITwG6O9G81g
Natural killer cells attacking cancer cell
Lone killer cell with remnant cytoskeleton
Break for discussion/questions!
No food, drink or gum in lab!
Thanks sincerely!

...Healthy, tasty & fresh, but not in lab!!
Hand-washing

The right way to wash your hands:

Thoroughly wash with soap and warm running water — rubbing your hands together for at least 10 seconds.

Hand-washing is the single most effective thing you can do to reduce the spread of colds and other infectious disease.

It's not necessary to use anti-bacterial soaps when washing up. Regular soap and water do the job just fine.

Also, using germicidal soaps too often may produce antibiotic-resistant bacteria.

Source: Hospital Infections Program, U.S. Centers for Disease Control and Prevention

NB: Happy Birthday Song 20-30 sec!!

http://www.squidsoap.com/
PREPARATION

1. WASH & DRY

2. ALCOHOL

3. [Image of hands using alcohol wipes]
SAMPLE+TESTS

1. OBTAIN \( \mu \) SAMPLE

2. BLOOD GLUCOSE

3. BLOOD TYPING
Glucose: Sugar in Blood

Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: ≥ 126 mg/dL

NB: Read & Record!
BLOOD TYPING

1. ADD ANTISERA

2. MIX W/TOOTHPICKS

3. READ & RECORD!!
10 Q? Clumping in Any Wells?

Source: S Wong, BI 121 Lab, 2016
CLEAN-UP!

1. FOLD DIAPER
2. BLOOD PRODUCTS
3. REWASH!!
Blood Chem Lab Q?
B Antigens
(Agglutinogens)
A & B Antigens
(Agglutinogens)
No Antigens

(Agglutinogens)
A Antibodies
(Agglutininis)
Clumping with anti-A serum
No Clumping with anti-A serum
Erythroblastosis Fetalis?

eg, Rh- mom Rh+ baby

Erythroblastosis Fetalis or Hemolytic Disease of the Unborn/Newborn

Throw Blanket Over This Step!

(a) First pregnancy
(b) Rh- mother
(c) Second pregnancy

First Rh+ fetus
Second Rh+ fetus

Rh+ antigens
Placenta
Inject Mom with RhoGam \( \leq 48-72 \text{ hr} \) > each Rh+ Pregnancy

The Blanket is RhoGam \( \rightarrow \) Masks the Mom’s Immune System!
Diabetic & Normal Response to Glucose Load

Blood glucose level (mg/100 ml)

Hours

Diabetes
Normal

Guyton & Hall 2000
**Proinsulin with C-Connecting Peptide**

**FIG. 10-4.** Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

DO Norris 1980
NB: Diabetics have problems either here or here.

Cellular uptake and utilization of glucose

Fox 1987
<table>
<thead>
<tr>
<th></th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of cases</td>
<td>5–10%</td>
<td>90–95%</td>
</tr>
<tr>
<td>Age of onset</td>
<td>&lt;30 years</td>
<td>&gt;40 years&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Associated characteristics</td>
<td>Autoimmune diseases, viral infections, inherited factors</td>
<td>Obesity, aging, inherited factors</td>
</tr>
<tr>
<td>Primary problems</td>
<td>Destruction of pancreatic beta cells; insulin deficiency</td>
<td>Insulin resistance, insulin deficiency (relative to needs)</td>
</tr>
<tr>
<td>Insulin secretion</td>
<td>Little or none</td>
<td>Varies; may be normal, increased, or decreased</td>
</tr>
<tr>
<td>Requires insulin</td>
<td>Always</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Older names</td>
<td>Juvenile-onset diabetes, Insulin-dependent diabetes mellitus (IDDM)</td>
<td>Adult-onset diabetes, Noninsulin-dependent diabetes mellitus (NIDDM)</td>
</tr>
</tbody>
</table>
Table 4–9

Warning Signs of Diabetes

These signs appear reliably in type 1 diabetes and, often, in the later stages of type 2 diabetes.

- Excessive urination and thirst
- Glucose in the urine
- Weight loss with nausea, easy tiring, weakness, or irritability
- Cravings for food, especially for sweets
- Frequent infections of the skin, gums, vagina, or urinary tract
- Vision disturbances; blurred vision
- Pain in the legs, feet, or fingers
- Slow healing of cuts and bruises
- Itching
- Drowsiness
- Abnormally high glucose in the blood
Diabetics must constantly juggle diet, exercise & medication to control blood glucose!
Like others, diabetics benefit from whole grains, vegetables, fruits, legumes & non-/low-fat milk products!
Exercise is a must based on its insulin-like effect!
WOW!  SUPER 🎩
~ TOP 5 - 10.

EXCELLENT!!
~ TOP 15.

GREAT EFFORT
~ TOP 20 - 25.