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 to 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: O₂ 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!

Ghost, marshmallow or white blood cell?
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)

Packed cell volume, or hematocrit
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
Platelet Plug Formation

1. Platelets adhere to and are activated by exposed collagen at the site of vessel injury.
2. Activated platelets release ADP.
3. ADP activates other platelets passing by.
4. Newly activated platelets aggregate onto growing platelet plug and release even more platelet-attracting chemicals.
5. Normal (uninjured) endothelium releases prostacyclin and nitric oxide, which inhibit platelet aggregation, so platelet plug is confined to site of injury.
Break for discussion/questions!
A Antigens
(Agglutinogens)
B Antigens
(Agglutinogens)
A & B Antigens
(Agglutinogens)
No Antigens
(Agglutinogens)
A Antibodies
(Agglutinins)
Clumping with anti-A serum
No Clumping with anti-A serum
Blood Type Distribution, General Population

- Type O+: 38%
- Type A+: 34%
- Type B+: 6%
- Type AB+: 9%
- Type B-: 2%
- Type O-: 7%
- Type A-: 3%
- Type AB-: 1%
Erythroblastosis Fetalis?

e.g., Rh- mom Rh+ baby


Erythroblastosis Fetalis or Hemolytic Disease of the Unborn/Newborn

Throw Blanket Over This Step!
Inject Mom with RhoGam ≤ 48-72 hr > each Rh+ Pregnancy

The Blanket is RhoGam → Masks the Mom’s Immune System!
Diabetic & Normal Response to Glucose Load
Glucose: Sugar in Blood

Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: ≥ 126 mg/dL
**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
Times of Plenty!!

NB: Diabetics have problems either here or here.

Cellular uptake and utilization of glucose

Fox 1987
1994 Diabetes Prevalence in the US by State

**2010 Diabetes Prevalence in the US by State**

![Map of the United States showing diabetes prevalence by state as of 2010. The map uses color coding to indicate different prevalence rates.](image)

**Key:**
- Yellow: <4.5%
- Light Blue: 4.5%–5.9%
- Green: 6.0%–7.4%
- Purple: 7.5%–8.9%
- Dark Green: ≥9%

<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>

<sup>a</sup>Age a factor in type 2 diabetes.
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!  RED 

SUPER 😊

~ TOP 5-10.

EXCELLENT!!

~ TOP 15.

GREAT EFFORT

~ TOP 20-25.