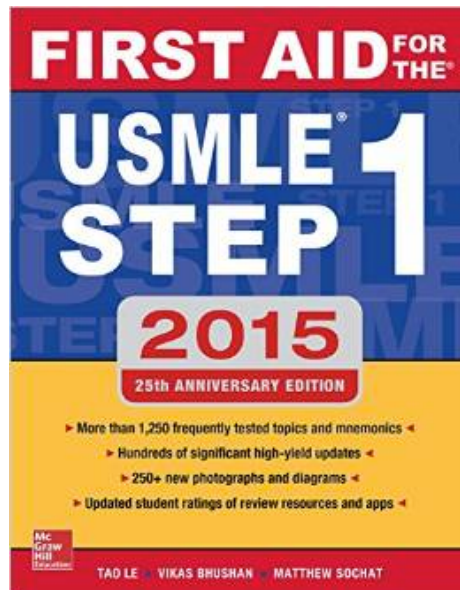


# ***Guide to Using First Aid During M1 and M2***



## Why First Aid is **Bad** for M1s

The basic science section is filled with time-wasting information. Did you really not know what happens to DNA during mitosis?

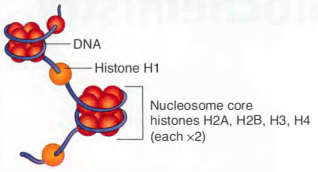
In my med school we had to be able to draw these freehand. So this info, while a good refresher for M2s, is much too basic for an M1 exam.

4 SECTION II BIOCHEMISTRY ▶ BIOCHEMISTRY—MOLECULAR

▶ BIOCHEMISTRY—MOLECULAR

**Chromatin structure** DNA exists in the condensed, chromatin form in order to fit into the nucleus. Negatively charged DNA loops twice around positively charged histone octamer to form nucleosome "bead." Histones are rich in the amino acids lysine and arginine. H1 ties nucleosome beads together in a string. In mitosis, DNA condenses to form chromosomes.

Think of "beads on a string."



Nucleosome core histones H2A, H2B, H3, H4 (each x2)

H1 is the only histone that is not in the nucleosome core.

<b>Heterochromatin</b>	Condensed, transcriptionally inactive, sterically inaccessible.	<b>Hetero</b> Chromatin = <b>H</b> ighly <b>C</b> ondensed.
<b>Euchromatin</b>	Less condensed, transcriptionally active, sterically accessible.	<b>Eu</b> = true, "truly transcribed."
<b>DNA methylation</b>	Template strand cytosine and adenine are methylated in DNA replication, which allows mismatch repair enzymes to distinguish between old and new strands in prokaryotes.	
<b>Histone methylation</b>	Inactivates transcription of DNA.	<b>M</b> ethylation makes DNA <b>M</b> ute.
<b>Histone acetylation</b>	Relaxes DNA coiling, allowing for transcription.	<b>A</b> cetylation makes DNA <b>A</b> ctive.

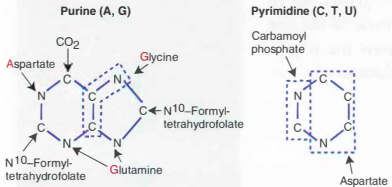
**Nucleotides**

**PUR**ines (A, G)—2 rings.  
**PY**rimidines (C, T, U)—1 ring.  
 Guanine has a ketone. Thymine has a methyl.  
 Deamination of cytosine makes uracil.  
 Uracil found in RNA; thymine in DNA.  
 G-C bond (3 H bonds) stronger than A-T bond (2 H bonds). ↑ G-C content → ↑ melting temperature.

**PUR**es **A**s **G**old.  
**CUT** the **PY** (pie).  
**T**hymine has a methyl.

**GAG**—Amino acids necessary for purine synthesis:  
 Glycine  
 Aspartate  
 Glutamine

Nucleo**S**ide = base + ribose (**S**ugar).  
 Nucleo**T**ides = base + ribose + phosphat**e**;  
 linked by 3'-5' phosphodiester bond.



I *dare* USMLE to write a question where knowing the difference between heterochromatin and euchromatin is required. If you were using this to study, you would be wasting your time.

## Why First Aid is **Good** for M1s

Diagrams organized for easy visualization of concepts, which can augment the graphics you get from your medical school.

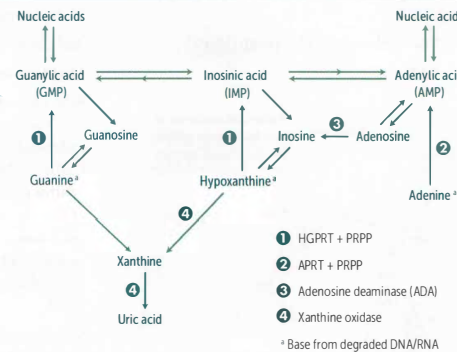
The most high-yield clinical associations for the basic sciences. Some professors will give you too many clinical associations, especially rare diseases that will never be tested. Correlating with FA can help you focus.

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SECTION II

BIOCHEMISTRY ► BIOCHEMISTRY—MOLECULAR

### Purine salvage deficiencies



#### Adenosine deaminase deficiency

Excess ATP and dATP imbalances nucleotide pool via feedback inhibition of ribonucleotide reductase → prevents DNA synthesis and thus ↓ lymphocyte count. One of the major causes of SCID. Autosomal recessive.

Severe Combined Immunodeficiency Disease (SCID) happens to kids. 1st disease to be treated by experimental human gene therapy.

#### Lesch-Nyhan syndrome

Defective purine salvage owing to absence of **HGPRT**, which converts hypoxanthine to IMP and guanine to GMP. Results in excess uric acid production and de novo purine synthesis. X-linked recessive. Findings: retardation, self-mutilation, aggression, hyperuricemia, gout, choreoathetosis.

He's Got Purine Recovery Trouble.

Mnemonics highlighted in red.

### Genetic code features

<b>Unambiguous</b>	Each codon specifies only 1 amino acid.	
<b>Degenerate/redundant</b>	Most amino acids are coded by multiple codons.	Exceptions: methionine and tryptophan encoded by only 1 codon (AUG and UGG, respectively).
<b>Commaless, nonoverlapping</b>	Read from a fixed starting point as a continuous sequence of bases.	Exceptions: some viruses.
<b>Universal</b>	Genetic code is conserved throughout evolution.	Exception in humans: mitochondria.

## ***How to Use First Aid **RIGHT** during M1***

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- Use the pictures to check your understanding
- Look for useful mnemonics, highlighted in red
- Scan for associated diseases, but don't spend too much time here (especially if your professor has not highlighted these in the lecture notes).

# Why First Aid is *Required* for M2 Organ Blocks

Graphics

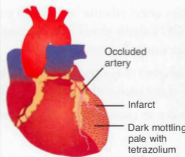
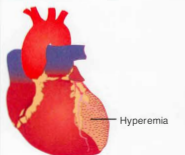
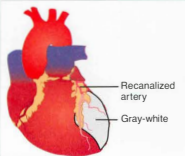
Mnemonics

Categorization

Clinical correlation

Separate High-Yield from Low-Yield

Check your understanding

270	SECTION III	CARDIOVASCULAR	CARDIOVASCULAR—PATHOLOGY
<b>Evolution of MI</b>			
Coronary artery occlusion: LAD > RCA > circumflex. Symptoms: diaphoresis, nausea, vomiting, severe retrosternal pain, pain in left arm and/or jaw, shortness of breath, fatigue.			
TIME	GROSS	LIGHT MICROSCOPE	RISK
0–4 hr	None	None	Arrhythmia, CHF exacerbation, cardiogenic shock
4–12 hr		Early coagulative necrosis, edema, hemorrhage, wavy fibers.	Arrhythmia
12–24 hr	Dark mottling; pale with tetrazolium stain	Contraction bands from reperfusion injury. Release of necrotic cell content into blood. Beginning of neutrophil migration.	Arrhythmia
1–3 days		Extensive coagulative necrosis. Tissue surrounding infarct shows acute inflammation. Neutrophil migration.	Fibrinous pericarditis
3–14 days	Hyperemic border; central yellow-brown softening—maximally yellow and soft by 10 days	Macrophage infiltration followed by granulation tissue at the margins.	Free wall rupture leading to tamponade, papillary muscle rupture, ventricular aneurysm, interventricular septal rupture due to macrophages that have degraded important structural components
2 weeks to several months		Contracted scar complete.	Dressler's syndrome

## ***How to Use First Aid **RIGHT** during M2***

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1. At the beginning of your organ block, skim the corresponding section. Note any clever mnemonics and get a basic idea of what you will be learning.
2. One week before your block exam, re-read the section more carefully. This should complete your knowledge, not give you more to memorize. Perhaps something you were struggling with will click into place.
3. Identify critical concepts you may have glossed over, but ignore anything your professor did not highlight. There will be time to learn it later, in line with your school's curriculum.
4. Put high-yield elements into your long-term memory system, and leave professor-specific details in your short-term memory system.

***Hear the Entire Podcast Episode (MSE2):***

[https://itunes.apple.com/us/podcast/  
medstudentedge-study-tips/id1002826531#](https://itunes.apple.com/us/podcast/medstudentedge-study-tips/id1002826531#)

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