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## UMMS Student Perspectives on Lecturing

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# UMMS Student Perspectives on Lecturing

## Executive Summary

Authors: Andrew Walls & Joel Bradley

Students have seen countless permutations of the PowerPoint lecture, and this document describes some techniques used by UMMS faculty that students have found particularly effective. It provides concrete examples pulled from among our more successful lectures, offering explanations as to how and why these methods help promote sound basic science learning.

## Maximizing the Effectiveness of Lecture Slides

### 1) Number

- i. 30-50 slides has been a successful format.
- ii. Consider: there is only 60 minutes for one to introduce oneself, deliver the lecture, field questions from students during and after and allow the next lecturer to begin on time.
- iii. Spending less than one minute per slide can lose your audience quickly.

### 2) Format

- i. Of the many possible approaches, some are more reliable: some students prefer text descriptions in the notes section; others prefer a comprehensive slide.
- ii. Multiple formatting examples are discussed in detail in the document
  1. Bullet points (Tom Smith)
  2. Text with notes (Berg/Rock)
  3. Effective integration of images, illustrations and video

### 3) Figures and Images

- i. Any graphic should be clearly and unambiguously labeled.
- ii. Abnormal should always be accompanied by the "normal" directly alongside for purposes of comparison.
- iii. Raw data graphs and images from the literature often require additional text explanation to convey the take-home point and contextualize the study in relation to the lecture material.
- iv. Examples from select lecturing styles are provided to demonstrate PowerPoints that are visually stimulating, logical and engaging.

## Lecture Structure

### 1) Content & Flow of Information

- i. Introduction slides
- ii. Periodic review slides
- iii. Summaries using comparison charts
- iv. Example outline of a lecture

### 2) Practice Questions and Clinical Vignettes

- i. At the beginning or at the end of a lecture? For later study? On this point, there was no definitive consensus.
- ii. Demonstrate critical diagnostic thinking and integrate knowledge of physical findings, biochemical pathways and lab values. Normal lab values should always accompany values given.

- iii. Vignettes should have multiple questions, beginning with a wide differential diagnosis that pares down, mimicking the skills required of clinical students.
- iv. An example of this approach is provided and analyzed.

## **The Nuts and Bolts**

### **1) Creating the Right Atmosphere**

- i. Forcefully engage your audience. If the lecture hall is thin, mandate that students move students to the front rows (protest notwithstanding).
- ii. Avoid electronic devices on your person as they frequently cause microphone feedback.
- iii. Be sensitive to the time constraints of your lecture slot.

### **2) Getting the Support You Need**

- i. Be aware that there are always students in the audience assigned to handle tech issues, adjust lighting, etc.
- ii. Don't be afraid to ask the course director/experienced lecturers for tips.

# Effective Practices In Lecture Writing Draft Version 1.0

From the Students of UMASS Medical 2012

Written and Created by Andrew Walls and Joel Bradley

5/16/2010



# The Purpose

- Medical Students have seen thousands of pages of PowerPoint lectures
- Some methodologies are more successful than others
- We have assembled the “effective practices” in lecture writing
- Not intended to limit, but to empower



# The Origin

- 20+ second year medical students sat down for a “effective practice” focus group late in second year
- Brainstorm and open discussion regarding any and all lectures and lecture styles
- Identification of “effective practices”



# Brief Overview

- We hope to assist with the following aspects of lecture-writing
  - Slides
    - What is an appropriate number?
    - Format
    - Use of figures and images
  - Lectures
    - Content
    - Structure
    - Practice Questions and Clinical Vignettes
  - Presenting
    - Creating the right atmosphere
    - Support
  - Examples of two effective lectures



# What is the appropriate number of slides?

- Lectures should avoid exceeding 60 slides
  - This leaves ~1 minute per slide
  - Most successful lectures are 30-50 slides
- Students will read and reread lectures many times
  - Each slide should carry about equal weight





# Creating a Good Slide

- Include only the essential information
  - 3-4 bullets is ideal
  - Clearly legible
  - Watch for typos!
- Use a variety of methods
  - Text
  - Well-labeled images
    - Gross → microscopic
    - Normal vs. abnormal
  - Illustrations
  - Animations
  - Video\*

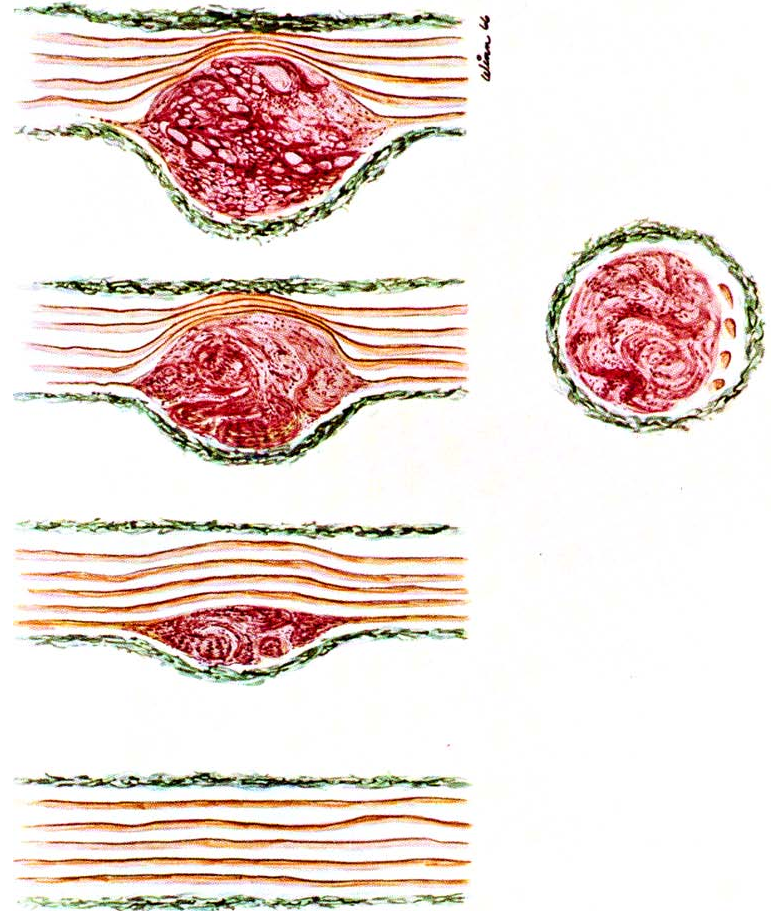
# Example of a Successful Slide Series

- The following four slides are from a UMMS lecture on brain malignancies
- Presents the information for schwannomas



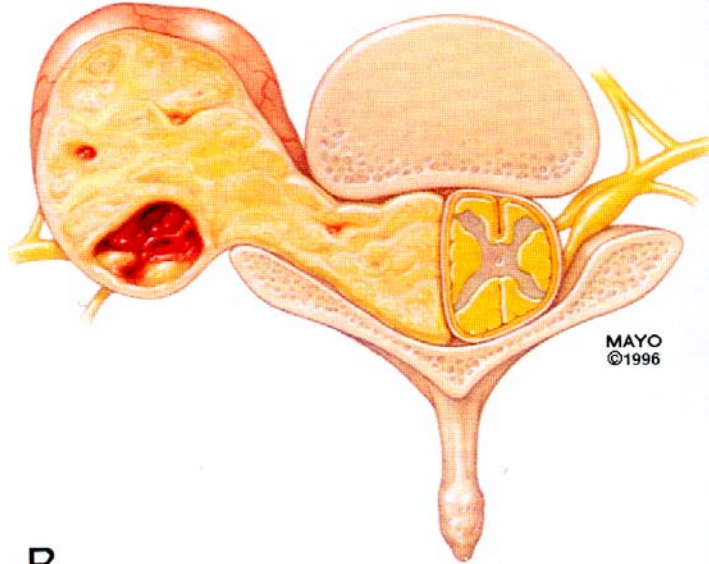
# Sheath tumors: schwannoma

- Cell of origin:
  - Schwann cells in cranial and spinal nerves
- Location:
  - Cranial & spinal nerve roots
  - Most intracranial schwannomas originate from the vestibular branch of CN8 (clinical presentation = unilateral hearing loss)
- Biologic behavior:
  - Slow-growing, benign
- Treatment:
  - Surgical resection or stereotactic radiosurgery

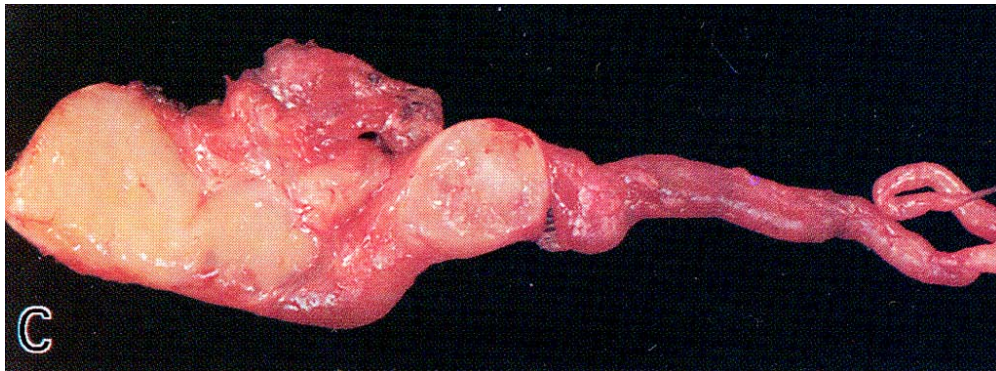


- Discrete encapsulated mass
- Separate from nerve of origin
- Compress but do not invade brain or spinal cord

# Schwannoma

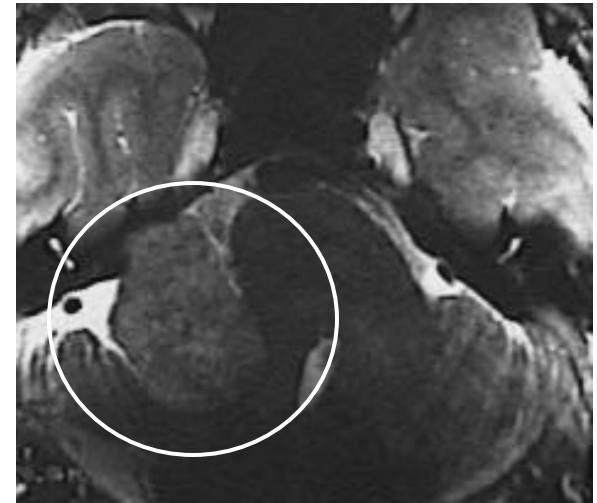
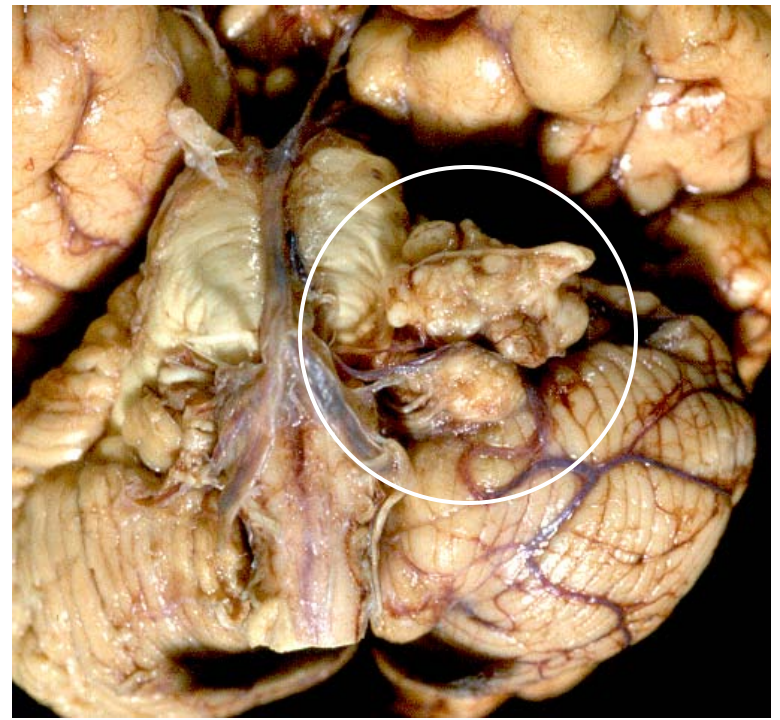


B



C

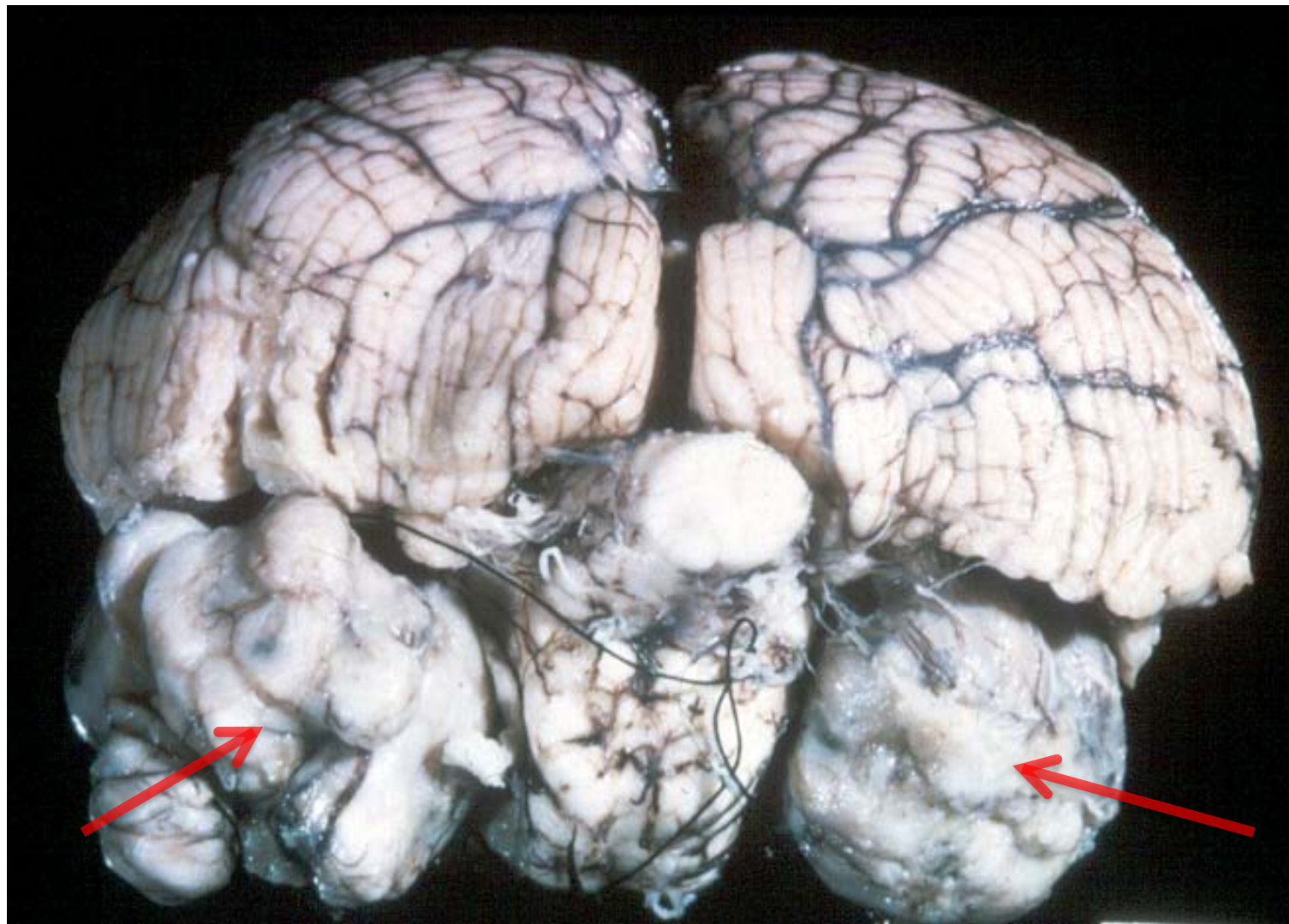
Spinal nerve schwannoma



Vestibular (CN 8) schwannoma



# Schwannoma

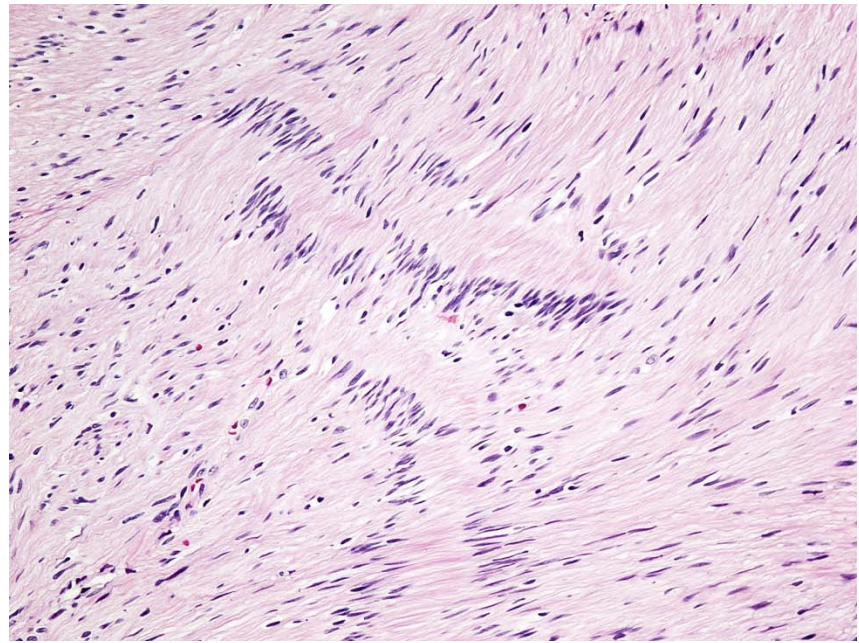


Bilateral vestibular schwannomas in a patient with NF2

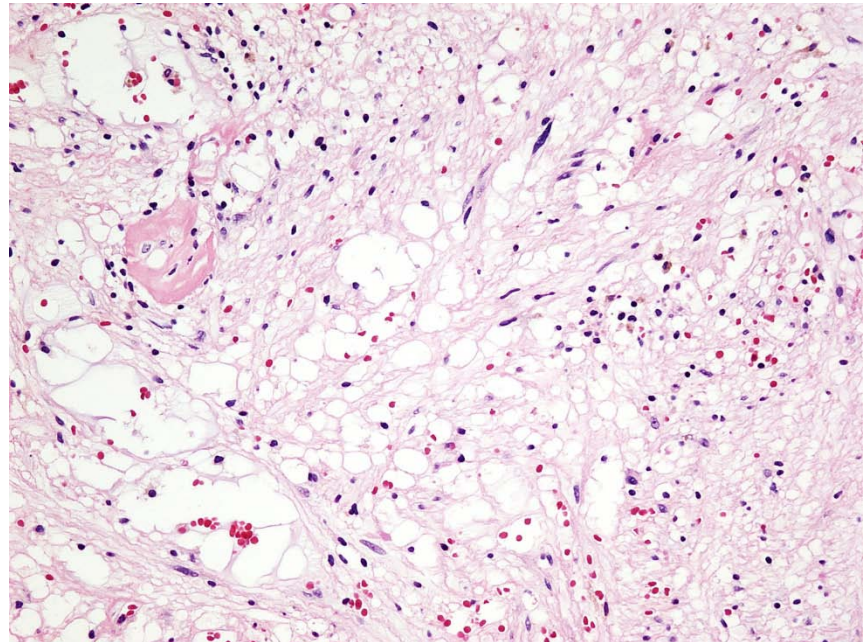
# Schwannoma

## Microscopic:


- Benign spindle cells
- Compact (Antoni A) and loose (Antoni B) areas



Compact zone: Antoni A



Loose zone: Antoni B



# effective Practices from the Schwannoma Slide Series

- Text
  - Lists important facts about the disease
  - Easily understandable and “stands alone” while not being overly wordy
    - 3-4 bullets of information
- Images/Figures
  - Variety
    - Illustrations (x2)
    - Gross Images (x3)
    - Medical Imaging (x1)
    - Microscopic Appearance (x2)
  - Well-labeled
- Overall
  - Paints a picture of the disease and its process
  - Visually stimulating
  - Clear to the student what they should know



# Another Example of an Effective Slides Series

- The following series presents a more biochemical sort of process
- Note accompanying text to walk the student through the material



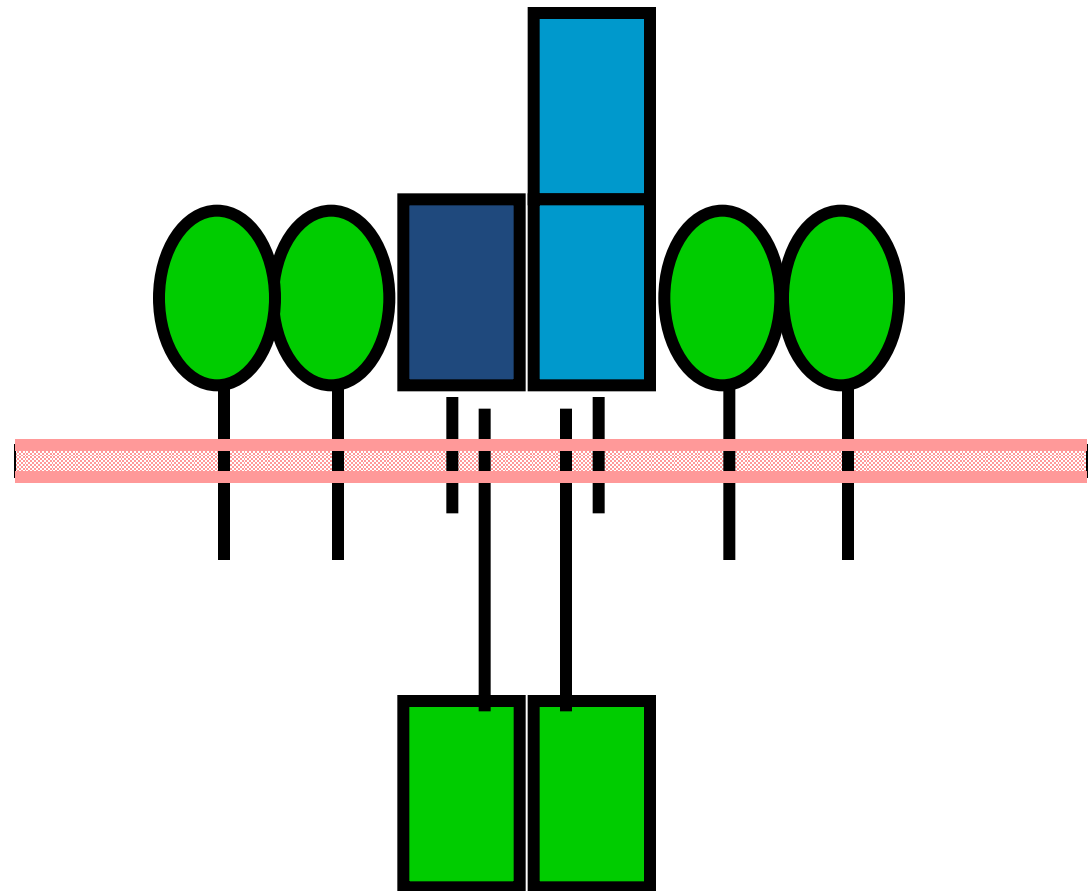
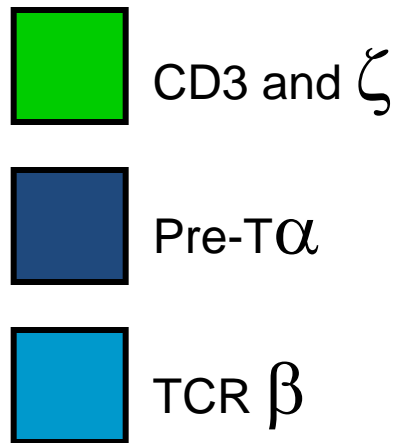




# What regulates T cell development?

- The early stages of  $\alpha\beta$  T cell maturation are dependent on productive rearrangement of the TCR  $\beta$  chain
  - DN thymocytes are rearranging their TCR  $\beta$  chain genes
  - DN thymocytes that produce a productive TCR  $\beta$  chain protein differentiate into DP thymocytes (CD4+8+)
  - This developmental progression is mediated by the pre-TCR, a complex of TCR $\beta$  with pre-T $\alpha$

# The pre-TCR complex



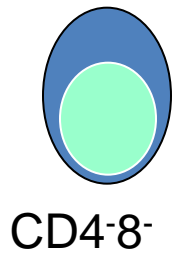
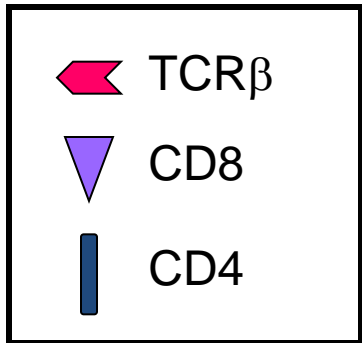
# Pre-TCR-mediated differentiation events

- DN thymocytes differentiate into DP (CD4+8+) thymocytes
- Cell proliferation, leading to 100-fold expansion
- Activation of TCR $\alpha$  chain rearrangements

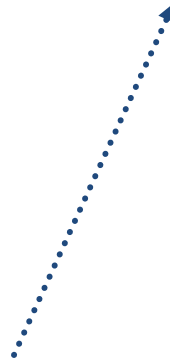
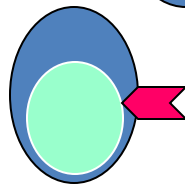
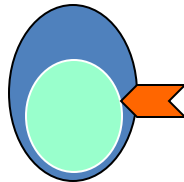
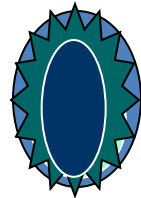


\*\*animation

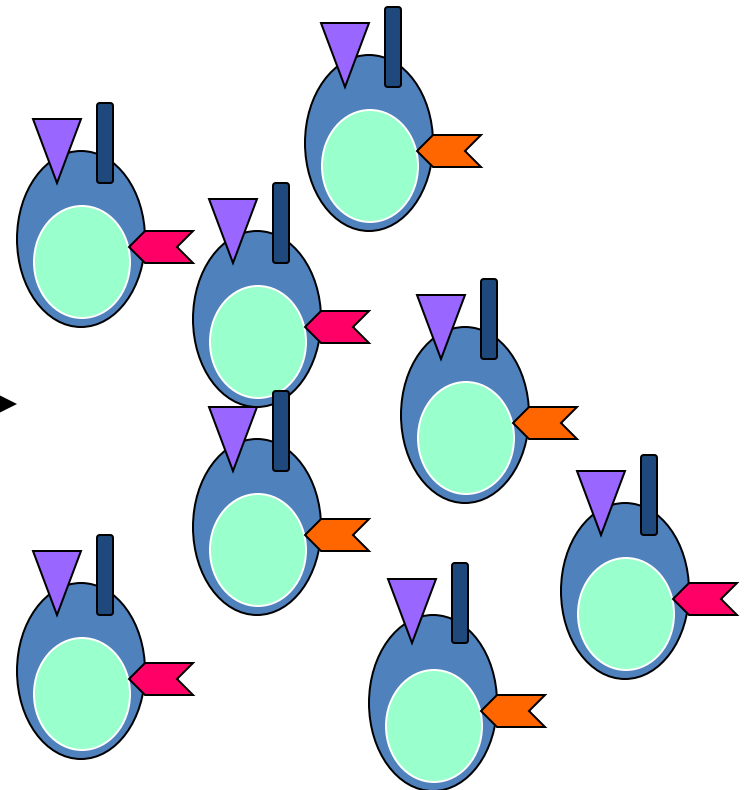
# Pre-TCR signaling



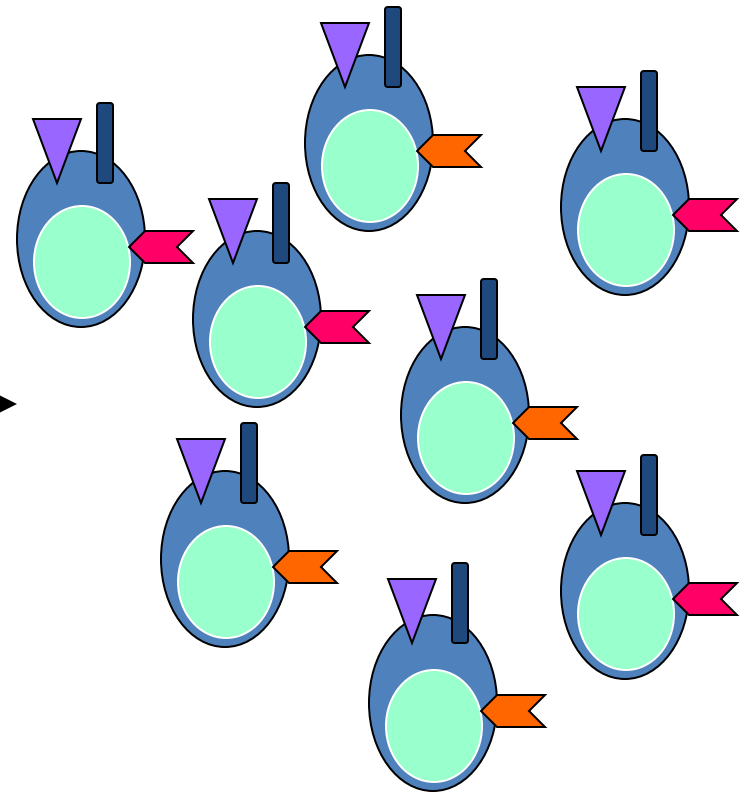
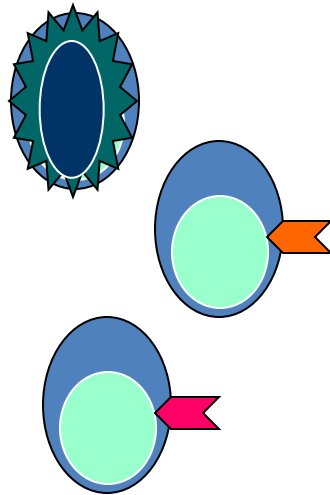
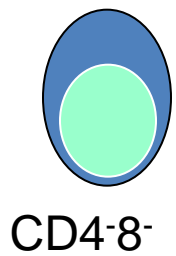
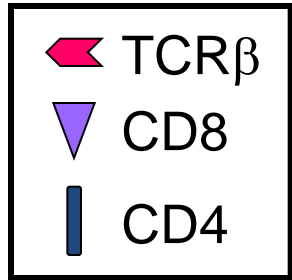
rearrange  
TCR  $\beta$



proliferation and expression  
of CD4 and CD8



# T cell immunodeficiencies




CD4<sup>+</sup>8<sup>+</sup>

deficiencies in cytokines, cytokine receptors, and cytokine receptor signaling proteins	deficiencies in TCR gene rearrangements and TCR signaling proteins
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# Summary of key points

- Developing T cells rearrange TCR  $\beta$  chain genes first
- Productive (in-frame)  $\beta$  chains pair with pre-T $\alpha$  chains to form pre-TCRs
- The pre-TCR signals DN thymocytes to proliferate, differentiate into DP cells, and commence TCR $\alpha$  chain gene rearrangement
- Deficiencies in TCR  $\beta$  chain rearrangement, pre-TCR signaling, or cytokine receptor signaling block T cell development and lead to immune deficiencies



# effective Practices Observed in “T-cell Development” Slides

- Text
  - Bullet points of important material
    - 3-4 bullets per page
    - Include underlying text
    - Summary slide following the sequence
  - Text explaining each image
    - Mirrors what is said in lecture to explain the images/animations
    - Clear to the student what is to be known from the animation
- Images/Animations
  - Brings to life an otherwise obtuse biochemical pathway
  - Animations allow a student to “walk through” the process
  - Colorful and clear

# A Note On Image Use:

- ALL images, slides, figures, graphs MUST BE CLEARLY LABELED
  - What is obvious to the practiced clinician is not always obvious to the first-time learner
  - Graphs from journal articles are not always well-labeled and need some modification





NOT EFFECTIVE



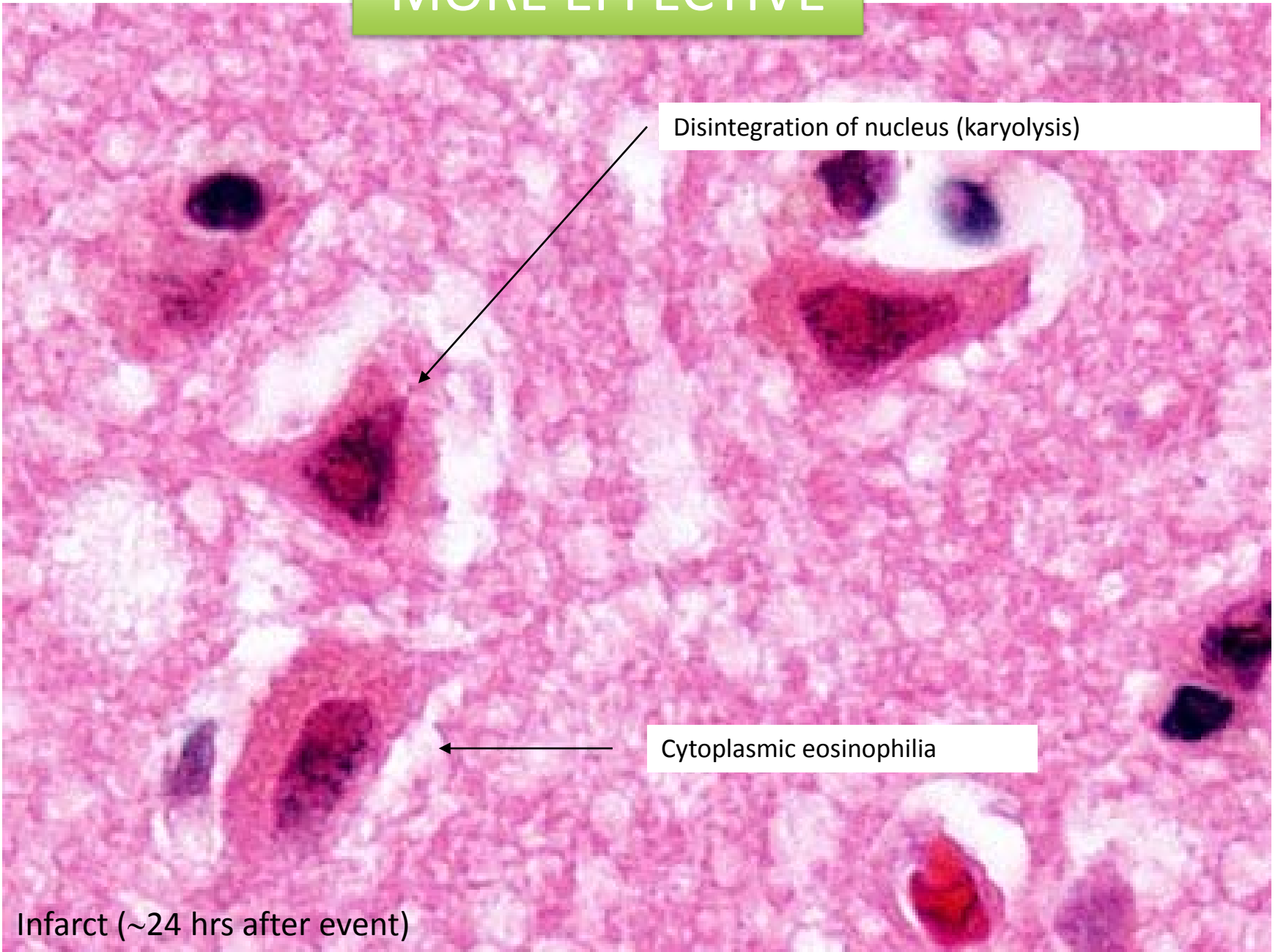
Infarct (~24 hrs after event)

# MORE EFFECTIVE

Disintegration of nucleus (karyolysis)

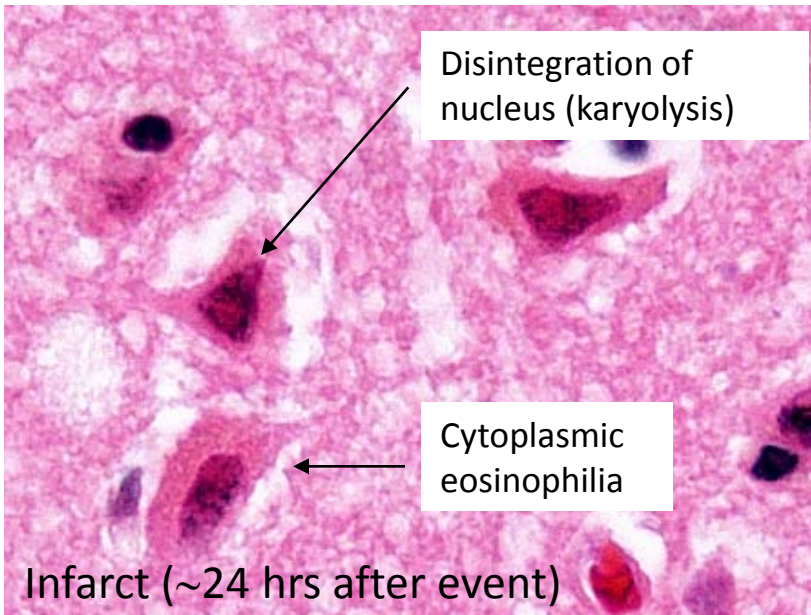
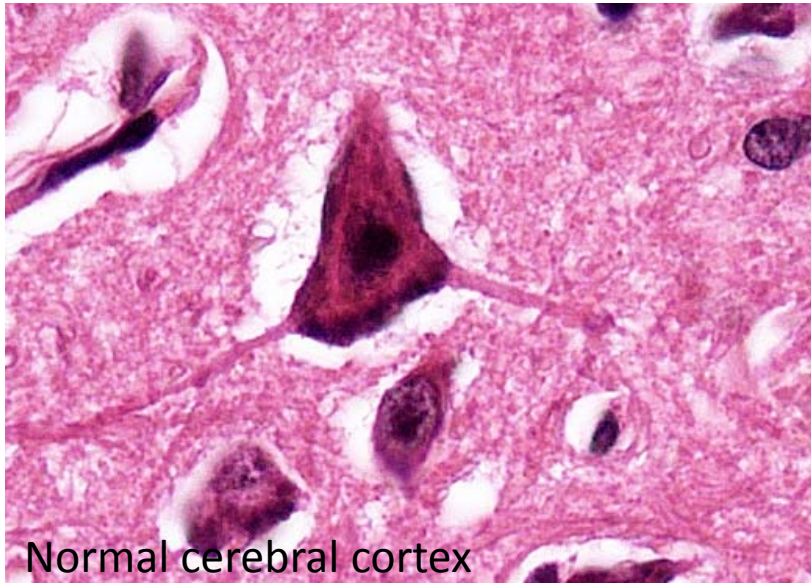
Cytoplasmic eosinophilia

Infarct (~24 hrs after event)

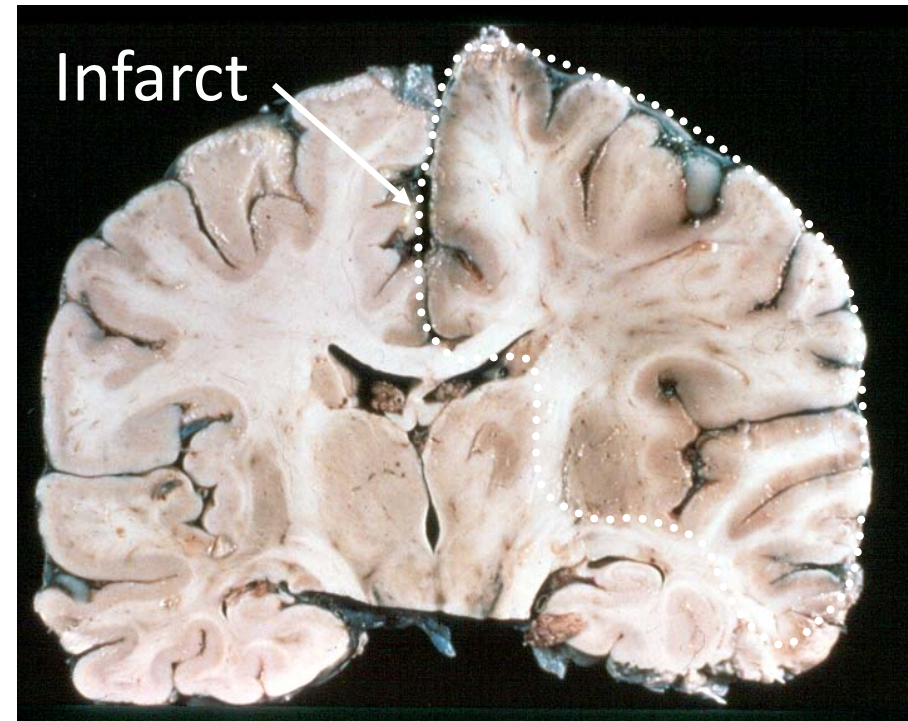


# Necrosis: example - brain

MOST EFFECTIVE



Cerebral infarction  
(ischemic stroke)

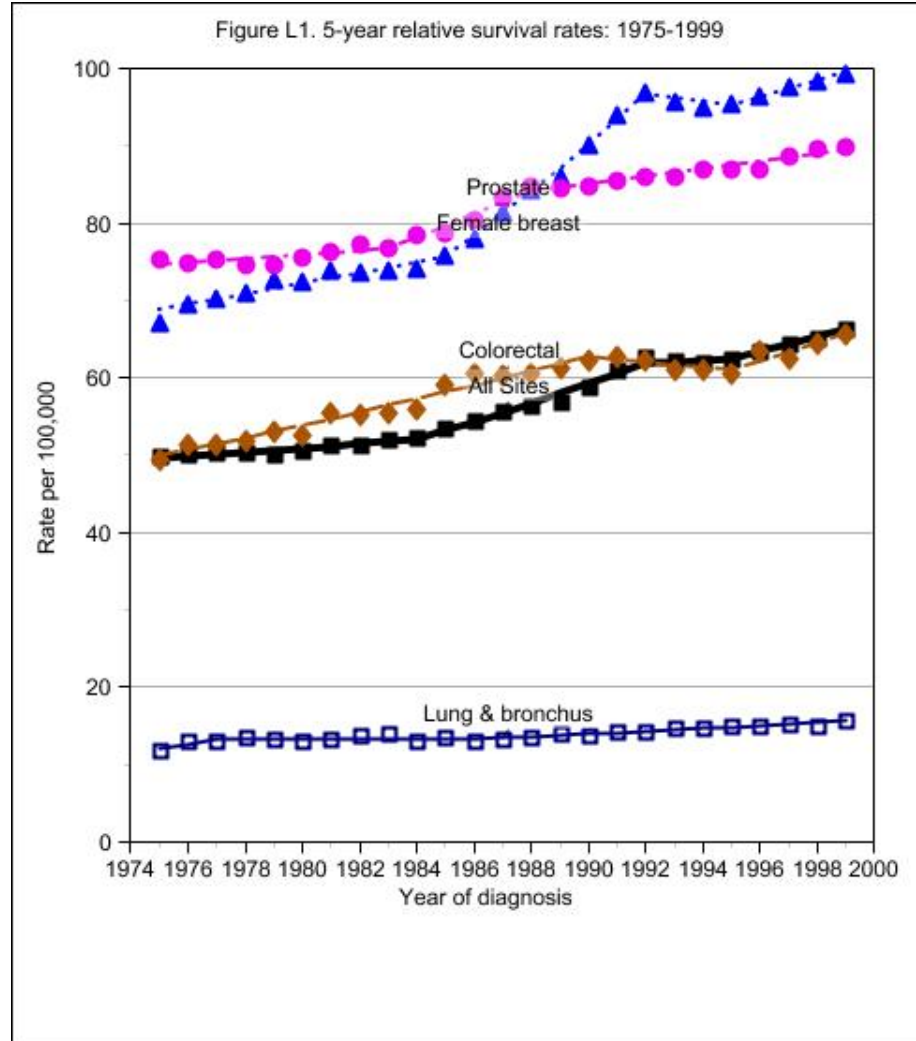


# A Note Regarding Graphs:

- Not all graphs and data are sufficiently labeled to stand alone
- It is not always clear to the student what the take-home point is



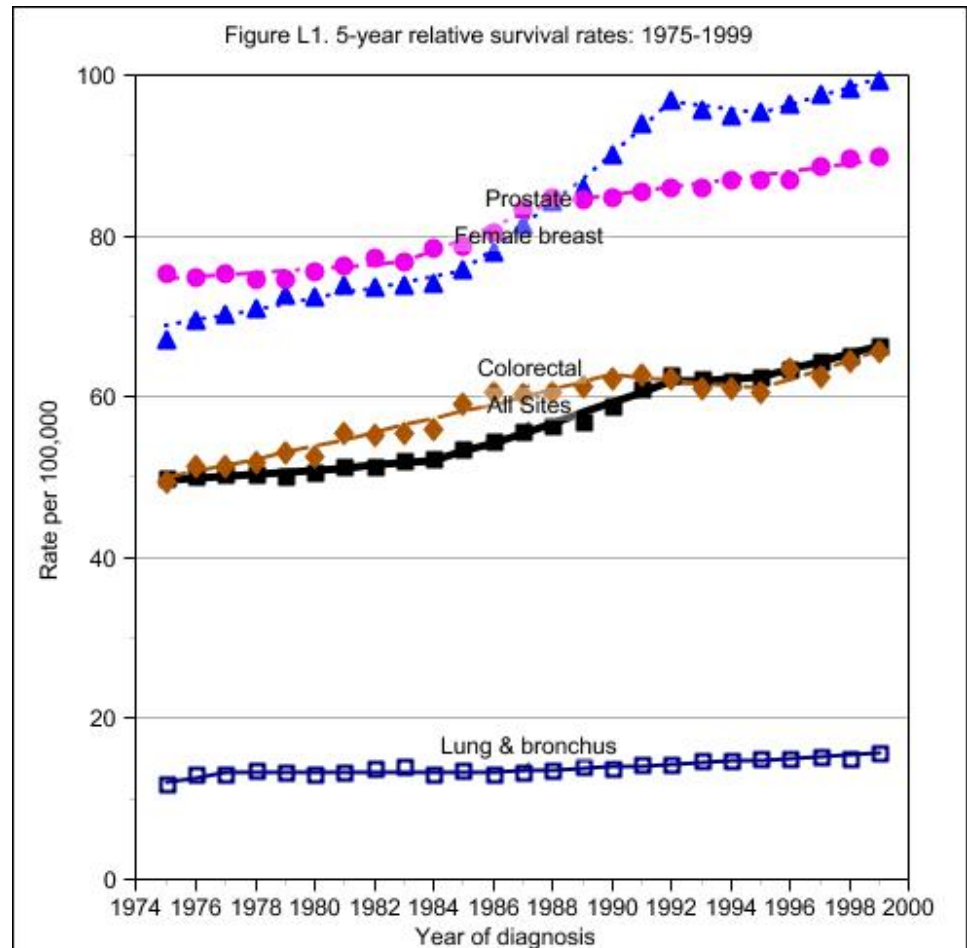
# Less Effective



Source: SEER Program, National Cancer Institute. Rates are from the SEER 9 areas (<http://seer.cancer.gov/registries/terms.html>).  
Data are not age-adjusted.

# More Effective

- Cancer Survival
  - Point #1
  - Point #2
  - Etc.



Source: SEER Program, National Cancer Institute. Rates are from the SEER 9 areas (<http://seer.cancer.gov registries/terms.html>). Data are not age-adjusted.

# Summary of effective Practices for Effective Slides

- Number
  - 30-50 is a good number
    - Over 60 borders on overwhelming
- Text
  - Include only the need-to-know in the bullet points
  - Additional info can be added “off the slide” as notes
- Images/Graphs/Histopathology
  - Well-labeled and explained
  - Variety
    - Gross, microscopic, illustrated, animated, medical imaging, video\*
- Overall
  - Visually stimulating
  - Required knowledge is crystal clear
  - Lecture can stand-alone when reviewed by the student at a later date

# Lecture Structure

- Introduction Slides
- Review/Summary Slides
- Practice Questions
- Clinical Cases



# Introduction Slides

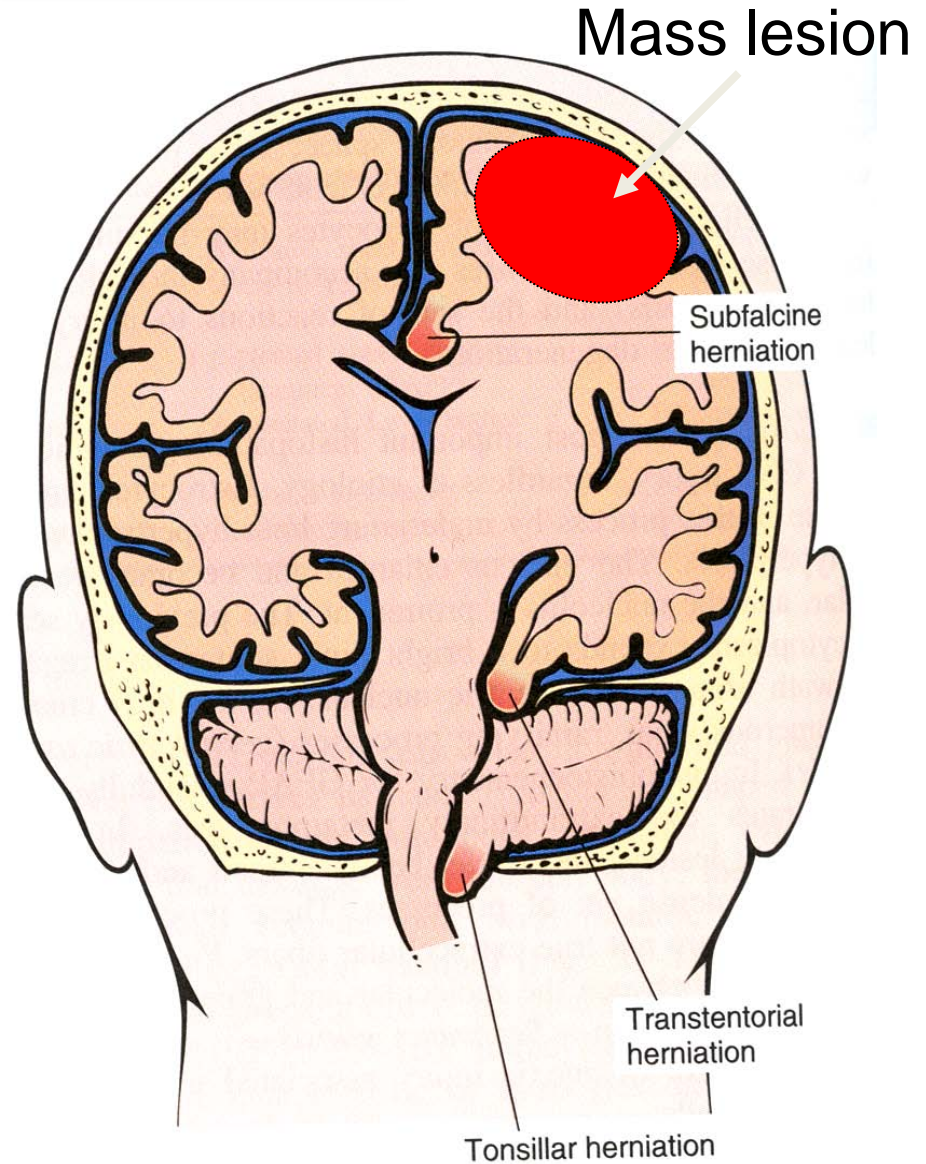
- Used to outline material that will be presented in the next section of the lecture
- During studying, allows reader to understand which diseases/processes fall into which categories
- The following two slides are examples from effective lectures

Increased intracranial pressure

Example #1

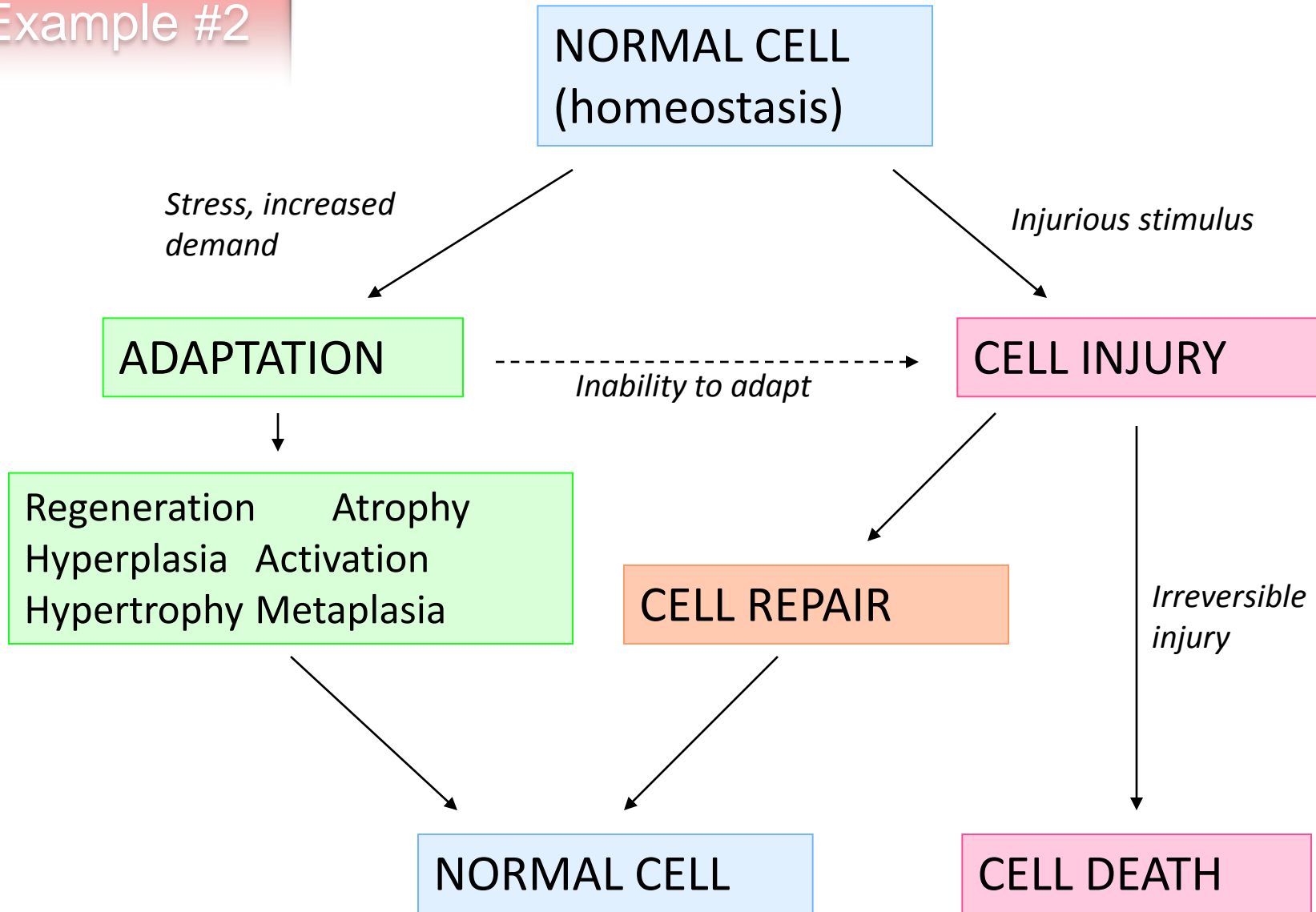
## Brain herniations

1. Subfalcian
2. Transtentorial
3. Cerebellar tonsillar



# Cellular responses to stress and injurious stimuli

Example #2





# Use of Summary Slides

- Summary Slides allow the students a quick review of the major points
- Reiteration is *critical* for first-time learners
- Allows a lecture to be broken into discrete units and built brick-by-brick.
- In addition to the summary slides seen earlier, here are two more examples...

## Example #1

# Necrosis vs. apoptosis: summary

## Features of Necrosis and Apoptosis

Feature	Necrosis	Apoptosis
Cell size	Enlarged (swelling)	Reduced (shrinkage)
Nucleus	Pyknosis → karyolysis	Fragmentation
Plasma membrane	Disrupted	Intact; altered structure
Cellular contents	Enzymatic digestion, leakage from cell	Intact; may be released in apoptotic bodies
Adjacent inflammation	Frequent	None (phagocytes ingest apoptotic fragments)
Physiologic or pathologic role	<i>Always</i> pathologic	Physiologic or pathologic



# Pyogenic Osteomyelitis

## Summary of Pathology

- Acute inflammation
- Bone necrosis
- Subperiosteal abscess
- Progressive ischemia leads to segmental bone necrosis (**sequestrum**) surrounded by viable new bone (**involucrum**) formation
- Draining sinus tracts
- Extension into joint space (acute septic arthritis)



# An Example Structure For a Lecture

- Introduction
  - Opening statement
  - Purpose
  - Outline to achieve purpose
- Item 1
  - Discussion (~3-5 slides?)
  - Summary
  - Clinical case?
- Item 2
  - Discussion (~3-5 slides?)
  - Summary
- Item 3
  - Discussion (~3-5 slides?)
  - Summary
- Closing
  - Address/reiterate common misunderstandings/confusing points
  - Comparison of Items 1-3
  - Clinical cases?
- Closing Statements and questions



# Practice Questions

- *Very Helpful* for the student
  - THE MORE THE BETTER
  - Allows an understanding of what type/depth of questions may be asked about the material
  - Allows the student to assess their knowledge when studying
  - Generally most useful as an addendum to lecture
    - Less effective as a summary slide
  - **MUST PROVIDE ANSWER KEY**
    - Explanation key is most helpful



# Clinical Cases

- Can be used at any point during the lecture
  - No apparent preference for beginning vs. middle vs. end
  - Beginning:
    - Captivating way to introduce a disease
    - Not much can be done in terms of audience participation
  - Middle/End
    - May be an effective form of summary (but must NOT replace simple summary slides)
    - May allow for more audience participation once information is digested
    - May also be used as “take-home” for the students to do on their own time

# Some Notes on Clinical Cases

- The more images/videos/visual aids the more it comes to life
- Always make answers available
- ALWAYS include the normal lab values
- Do not ask just one follow-up question but many
  - See example that follows



# Effective Clinical Case Example

(adapted from USMLE Step 1 Secrets ©2008)

- A 32-year-old woman of Ashkenazi Jewish descent complains of a long history of abd pain and diarrhea. On a typical day, she usually passes 15-20 loose stools. In the last few weeks, she has lost 15lbs and has experienced several episodes of bloody diarrhea. She denies any pain with bowel movements (tenesmus) but does complain of abd pain following meals.

1) What should be on the differential?

# Effective Clinical Case Example Cont.

Physical exam is significant for mild fever as well as abd. tenderness in the RLQ (right lower quadrant). Lab studies show an elevated erythrocyte sedimentation rate as well as decreased plasma levels of vitamins B12, D and K. Lower endoscopy reveals a “cobblestone” appearance and the presence of “skip” lesions in the terminal ileum and proximal colon. Biopsy reveals granulomas transmural, chronic inflammation.

- 2) What is the diagnosis?
- 3) Compare and Contrast the characteristics of Crohn’s disease and ulcerative colitis
- 4) In what special conditions does transmural inflammation of the colon occur in ulcerative colitis?
- 5) What congenital disorder results in constipation and severely dilated colon (similar to toxic megacolon)? What is this disease caused by?
- 6) How can Crohn’s Disease cause deficiencies of the fat-soluble vitamins?
- 7) Why might Cholestyramine help with this patient?

# Summary: Lecture Structure

- Introduction slides
  - Prepare your audience
  - Provide overview
- Summary Slides
  - Allow for reiteration
  - Clarify key points
- Practice Questions
  - Loved and appreciated by students...very helpful
- Clinical Cases
  - Can be used to introduce a disease
  - Can be an effective tool to synthesize all components of a lecture



# Some Final Tips On Delivering Lectures

- Be Supported!
  - Make sure the course director has provided you with everything you need to make a good lecture
  - Advocate for yourself and reach out for any materials/training/help you may need
  - Designated “tech” students are there to help!

# Your Allotted Time

- Lecture Length is like a speed limit: going under is just fine, going over is a problem



# Own Your Environment

1. Adjust lighting as needed
2. Distance pagers, cell phones, PDAs, etc as far from wireless microphone as possible
  - Causes buzzing and feedback
3. **Relocate students** to fill the front rows
  - Creates a more intimate and focused learning environment
  - Ignore the eye-rolling, students will be happy you did



# Play to Your Strengths

1. Be creative in creating and delivering your lecture
2. Remember: you are live act that cannot be replicated by a text book.....what is *unique and special* that you can contribute to the learning experience?



Thank you!

