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### SOUTHEASTERN AMERICAN INDIAN CANCER HEALTH EQUITY PARTNERSHIP

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## OUR PRESENTER

**Yuri Fedoriw,** MD

Yuri Fedoriw, MD is a Distinguished Professor and Vice Chair for Clinical Research and Academic Affairs Co-Director, UNC Project-Malawi Cancer Program.

Since 2011, he has been involved in the UNC Project-Malawi Cancer Program, developing and supporting diagnostic services in support of the Kamuzu Central Hospital Lymphoma Study, AIDS Malignancy Consortium and NIH-funded clinical trials. He now serves as the co- Director of the UNC Project-Malawi Cancer Program, the co-PI of the UNC-Malawi-South Africa Cancer Consortium (U54CA254564) and direct the translational lymphoma studies of samples submitted to UNC through this ongoing work. We have established weekly diagnostic telepathology conferences between Malawian pathologists and clinical teams to improve diagnostic accuracy and build regional capacity for cancer care. We support training in global cancer research through the recently awarded Malawi Cancer Outcomes Research Program (D43CA260641 Fedoriw, MPI) that aims to develop global cancer research leaders in Malawi and UNC.

Dr. Fedoriw's research interests focus on the immunologic and genetic mechanisms of lymphomagenesis, particularly in the setting of HIV infection. While hematologic malignancies and lymphoproliferative disorders (including Multicentric Castleman Disease) in sub-Saharan Africa arise under intrinsic and extrinsic pressures very different from those in the United States, comprehensive analyses of these diseases have not been performed. Our laboratory group uses advanced sequencing, immunophenotypic and cellular analyses to address gaps in our understanding of lymphomagenesis and tumor microenvironment in the context of HIV-associated immune dysregulation. Deciphering these tumor-host interactions is critical to better tailor treatment and improve outcomes, particularly in the era of cancer immunotherapy.

Dr. Fedoriw's clinical efforts revolve around the diagnosis and classification of benign and malignant hematolymphoid disorders. He served as the Director of Hematopathology at UNC from 2012-2019, and previously as the Director of the Hematopathology Fellowship Program. He has served on the NCI Lymphoma Clinical Trials Planning Group and the Hematology and Clinical Microscopy Committee for the College of American Pathologists. He is a member of the United States and Canadian Academy of Pathology Education Committee.

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OUR PRESENTER

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OUR PRESENTER

5. He has been a proud member of the UNC Cancer Community and LCCC since 2008

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3. He directed the division of Hematopathology from 2012-2019 before starting a research lab and taking over as the co-Director of the Malawi Cancer Program
2. He enjoys interaccting with clinical teams, trainees, staff and medical students
1. Married to a UNC Family Medicine physician which adds an important primary care perspective to cancer diagnosis

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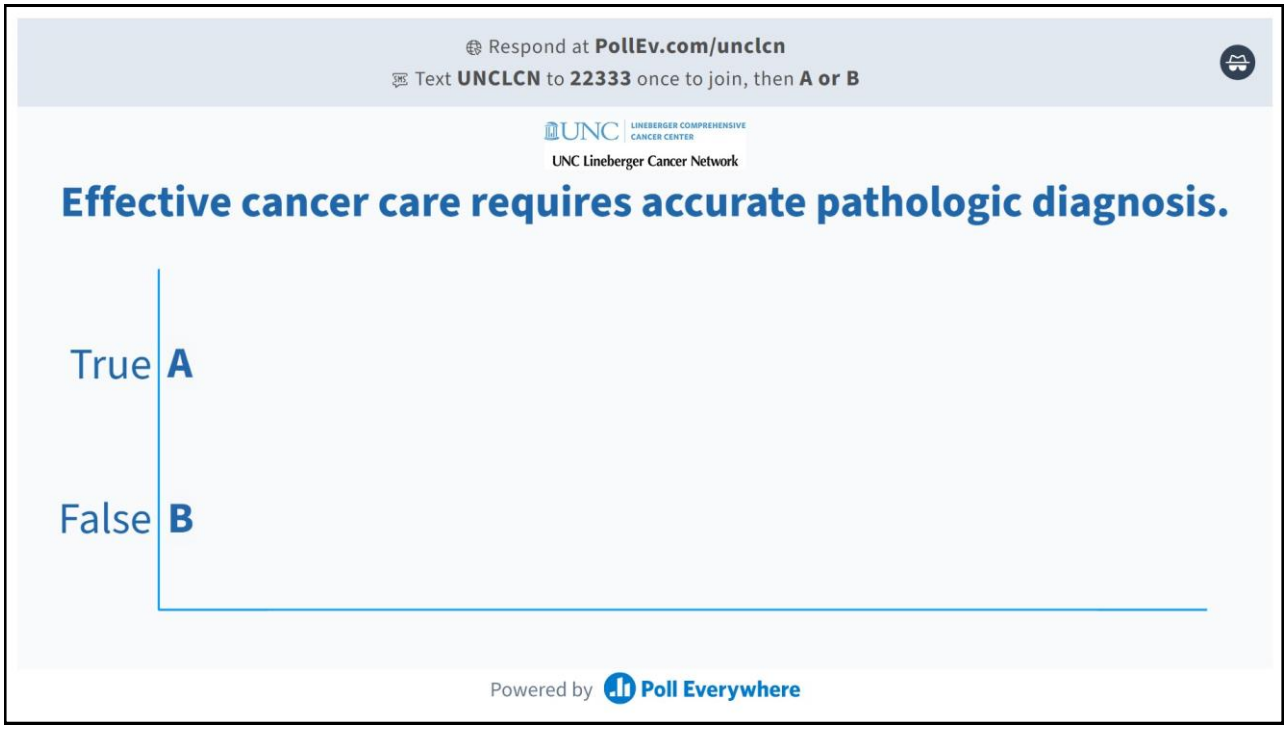


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## DISCLOSURES

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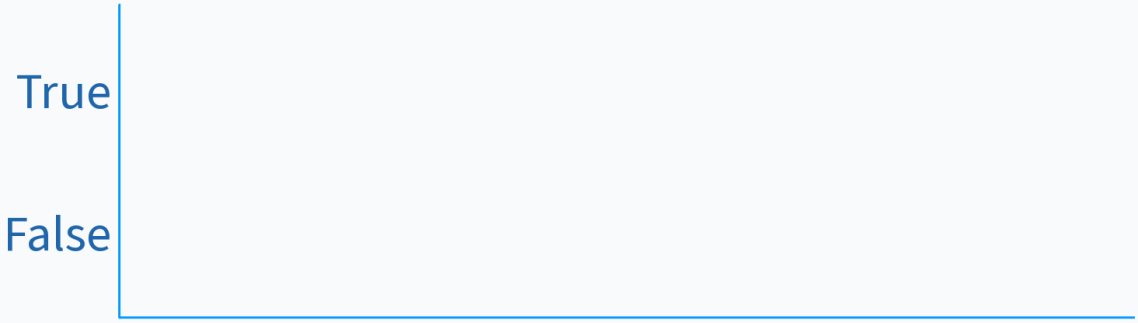
UNC Lineberger Cancer Network

## Effective cancer care requires accurate pathologic diagnosis.

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# Cancer Pathology

Yuri Fedoriw, MD
LabCorp Distinguished Professor of Pathology & Laboratory Medicine
Lineberger Comprehensive Cancer Center

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## Objectives

1. Describe the evolution of testing methods for cancer diagnosis.
2. Recognize how classification systems are developed to uniformly diagnose tumors.
3. Select appropriate tissue sampling method for cancer diagnosis.
4. Describe the development and application of CAP synoptic reporting for cancer diagnoses

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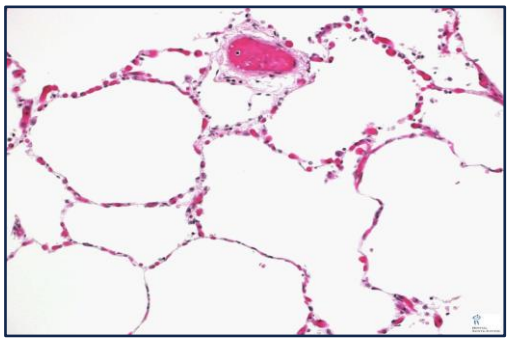
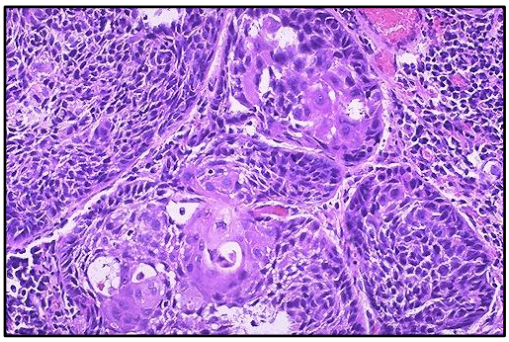
# Background





Normal Lung

Lung Cancer

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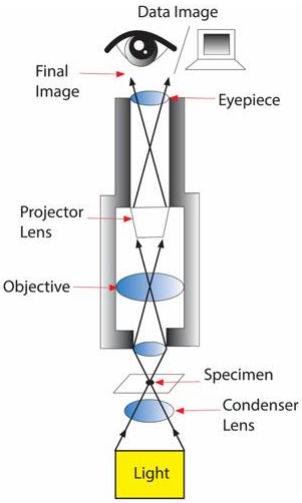
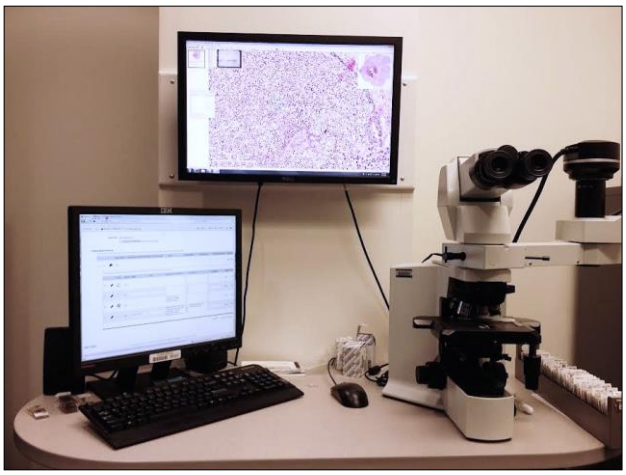
# Microscopy



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# Question 1

When a patient has a breast lumpectomy, when are the first slides ready to review by a pathologist?

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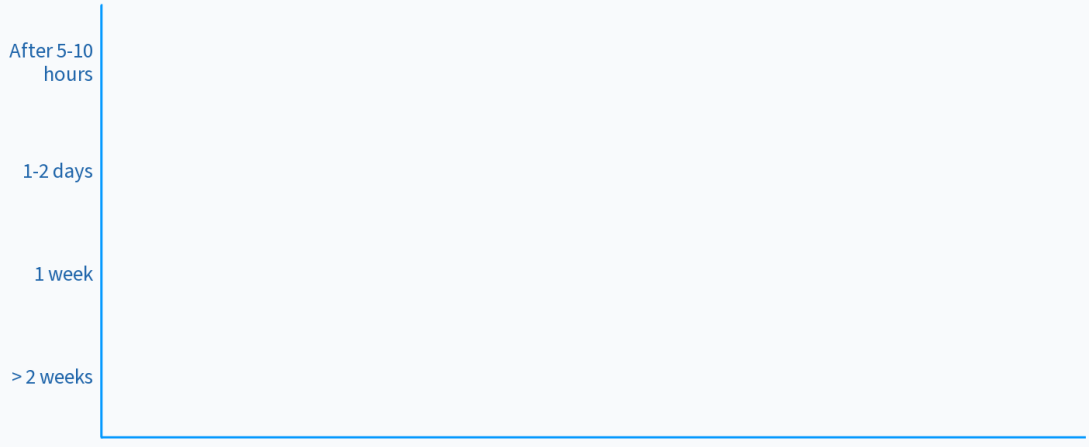
**When a patient has a breast lumpectomy, when are the first slides ready to review by a pathologist?**

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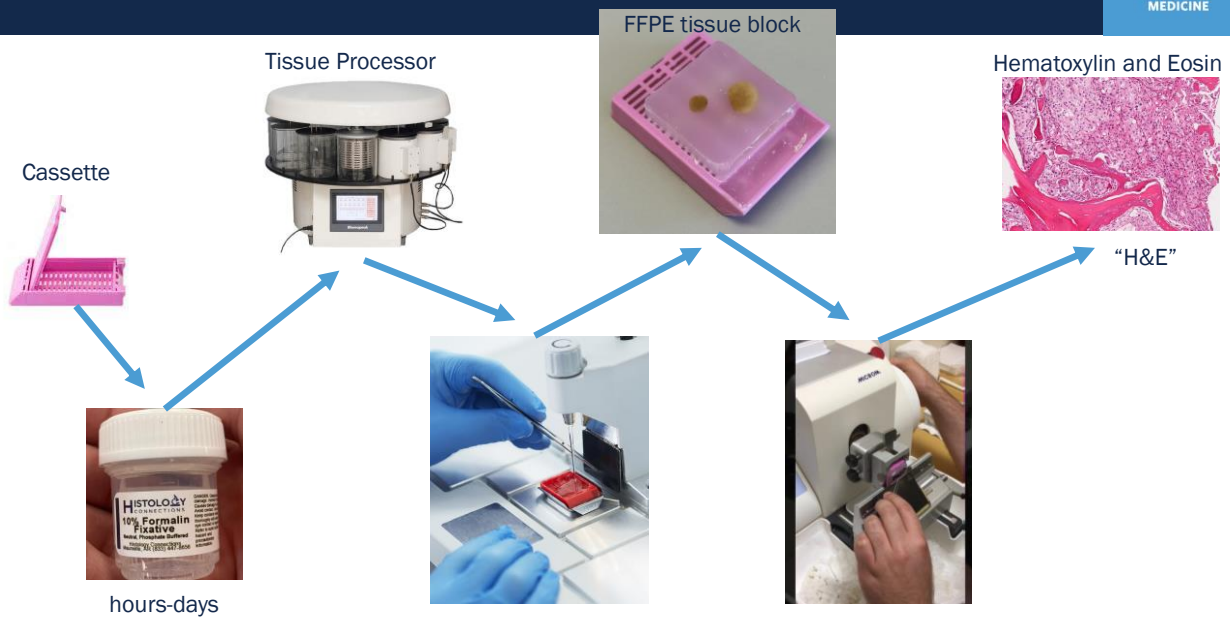
# Tissue Processing

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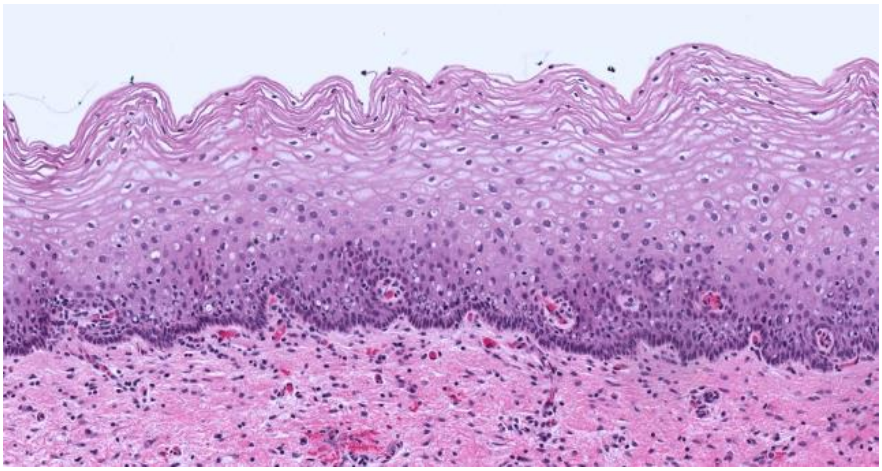
# Normal Epithelium - Cervix



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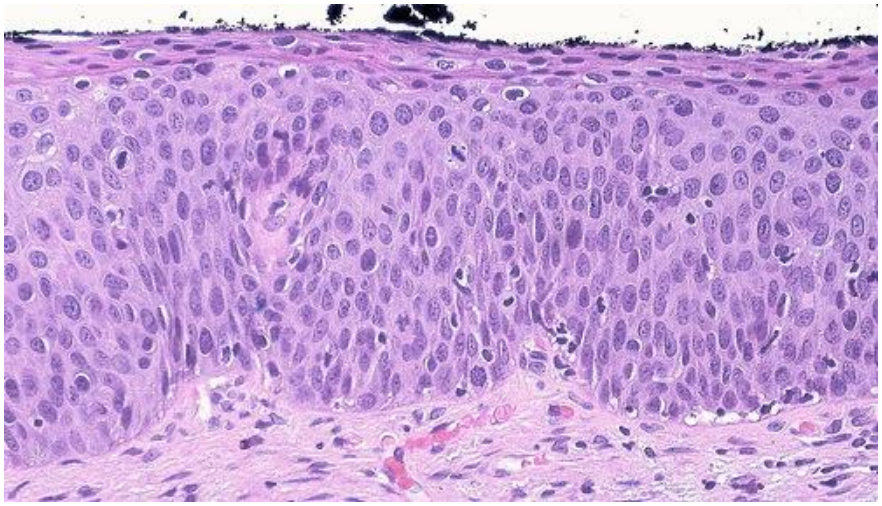
# Dysplastic Epithelium - Cervix



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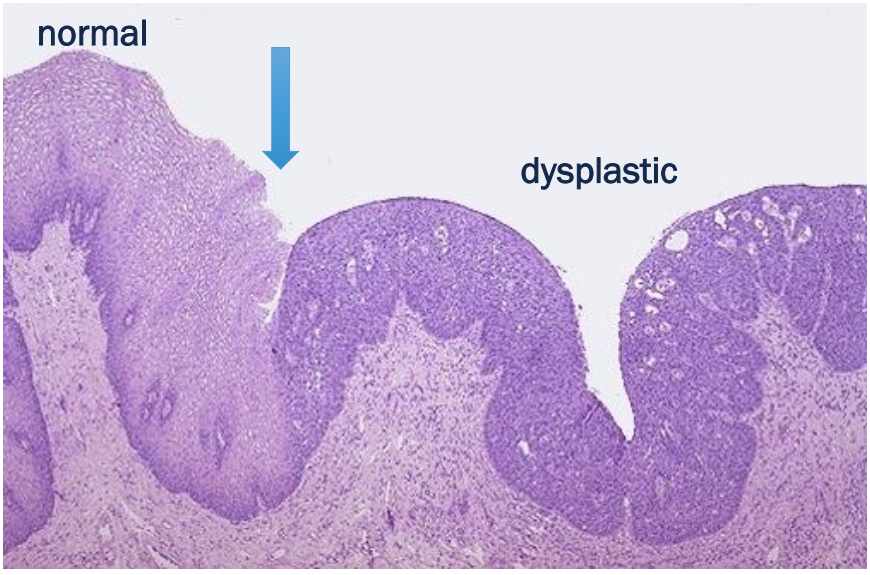
# Dysplasia – Cervical Dysplasia (HPV)

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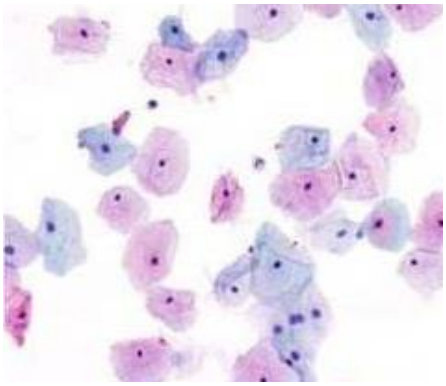
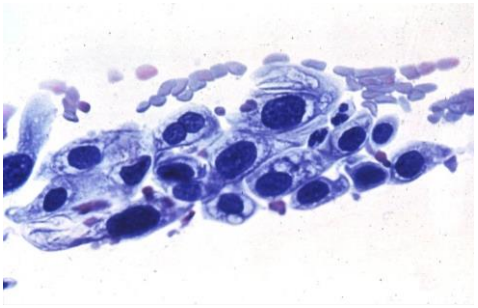
# Cytopathology



Benign Squamous Epithelial Cells



Dysplastic Epithelial Cells

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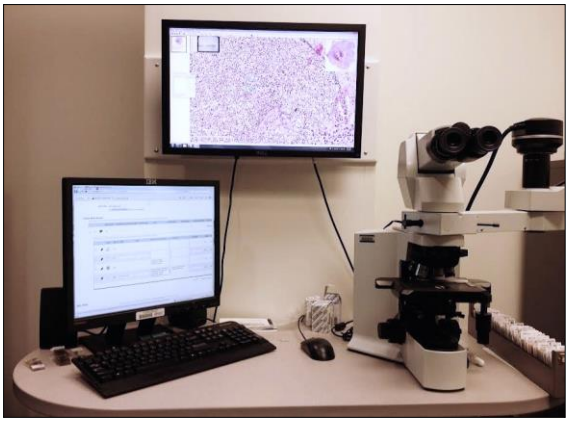
# Microscopy



Chapel Hill

Lilongwe, Malawi

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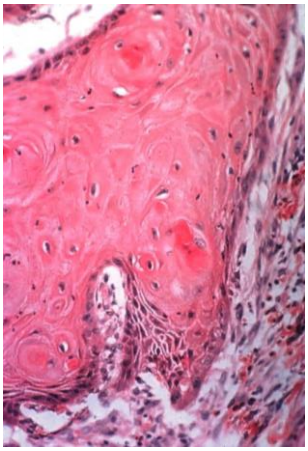
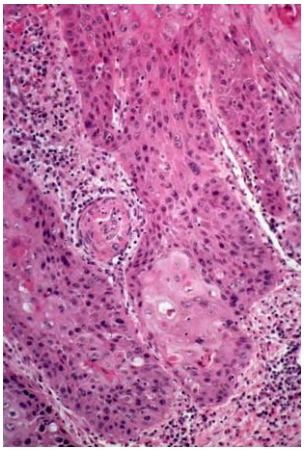
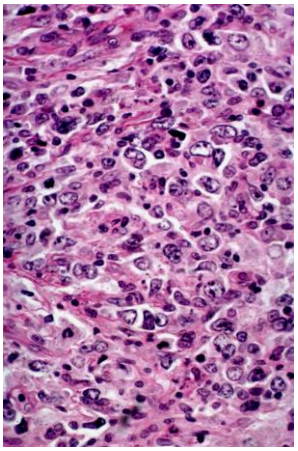
## "Grade" – Squamous Cell Carcinoma



Well-differentiated



Moderately-differentiated



Poorly-differentiated

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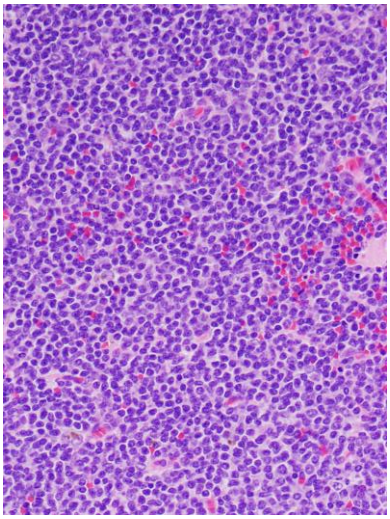
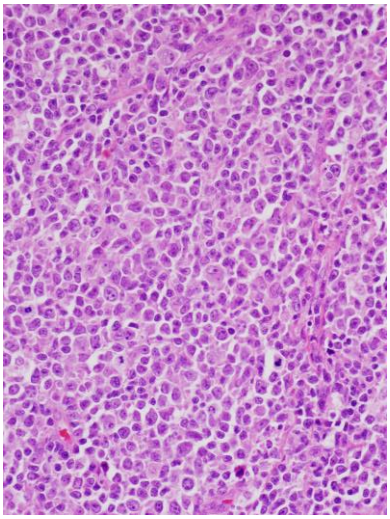
## Grade – Follicular Lymphoma



Low-grade



High-grade

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# Question 2

Colon cancers are common. A series of studies identifies a gene mutation associated with particularly poor outcomes. In this example, the gene represents:

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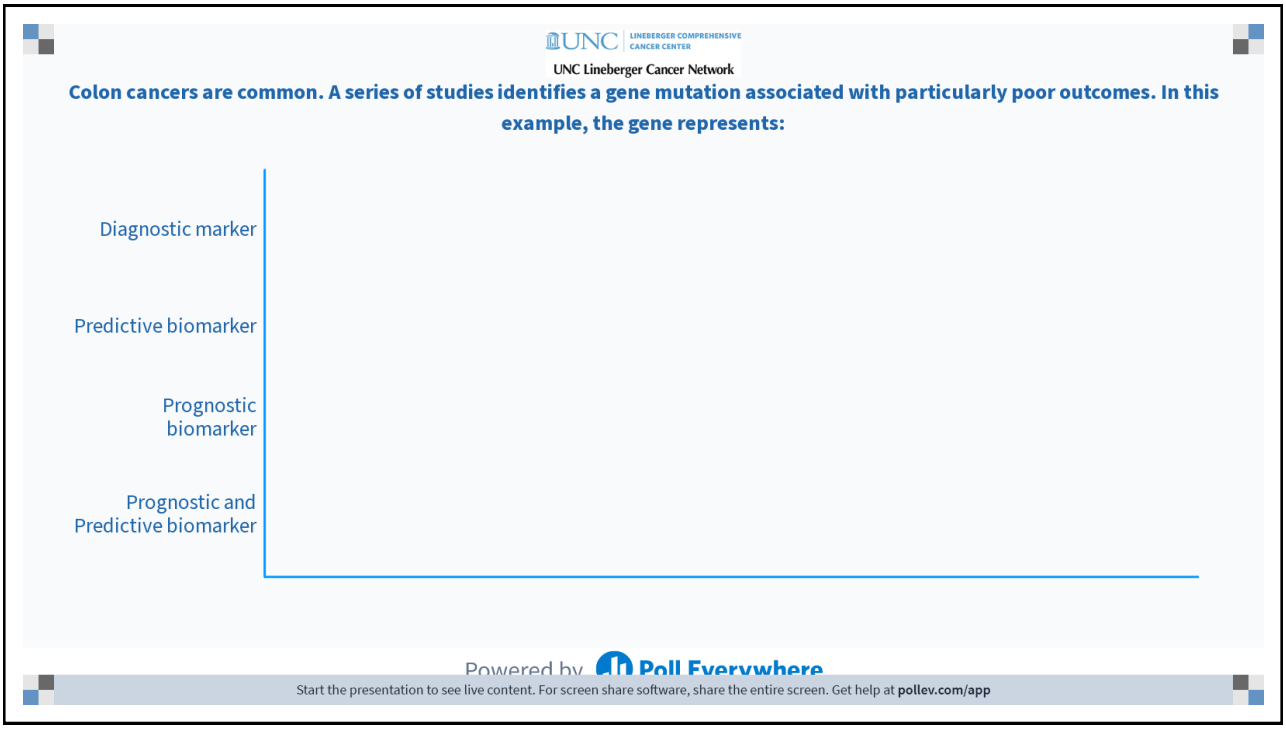


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# Evolution of Diagnostic Testing

- Not all cancers that *looked* the same *acted* similarly
- Cellular and molecular biology research → mechanisms of disease and features that are:
  - Diagnostic
  - Prognostic
  - Predictive
- Technology and understanding of biology → clinical care

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# B-cell Lymphomas - from maturation and classification

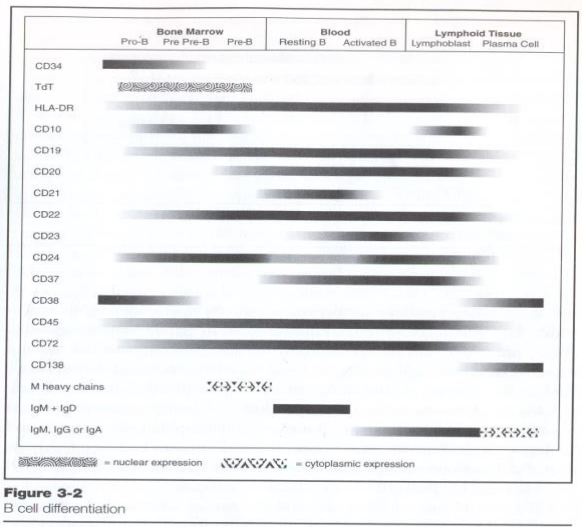
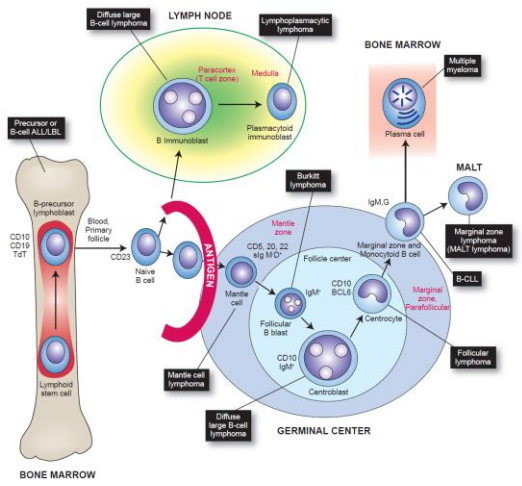



**Figure 3-2**
B cell differentiation




Shaffer AL 3rd, Young RM, Staudt LM. Pathogenesis of human B cell lymphomas. *Annu Rev Immunol*. 2012;30:565-610.

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# Immunophenotyping

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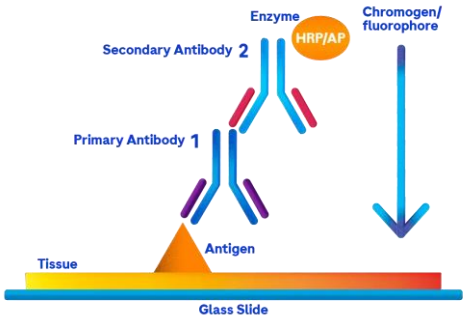
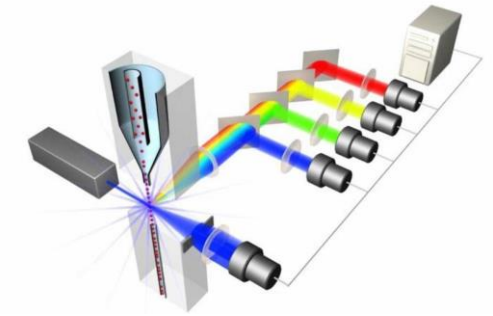
## Immunohistochemistry




## Flow Cytometry



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# Example of Flow Cytometry

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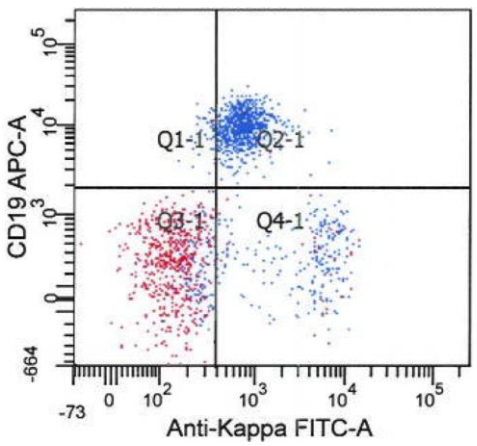


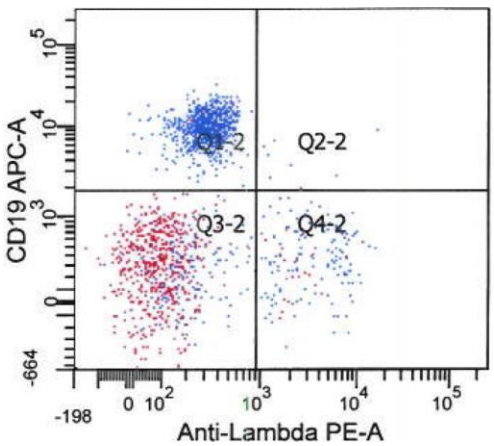


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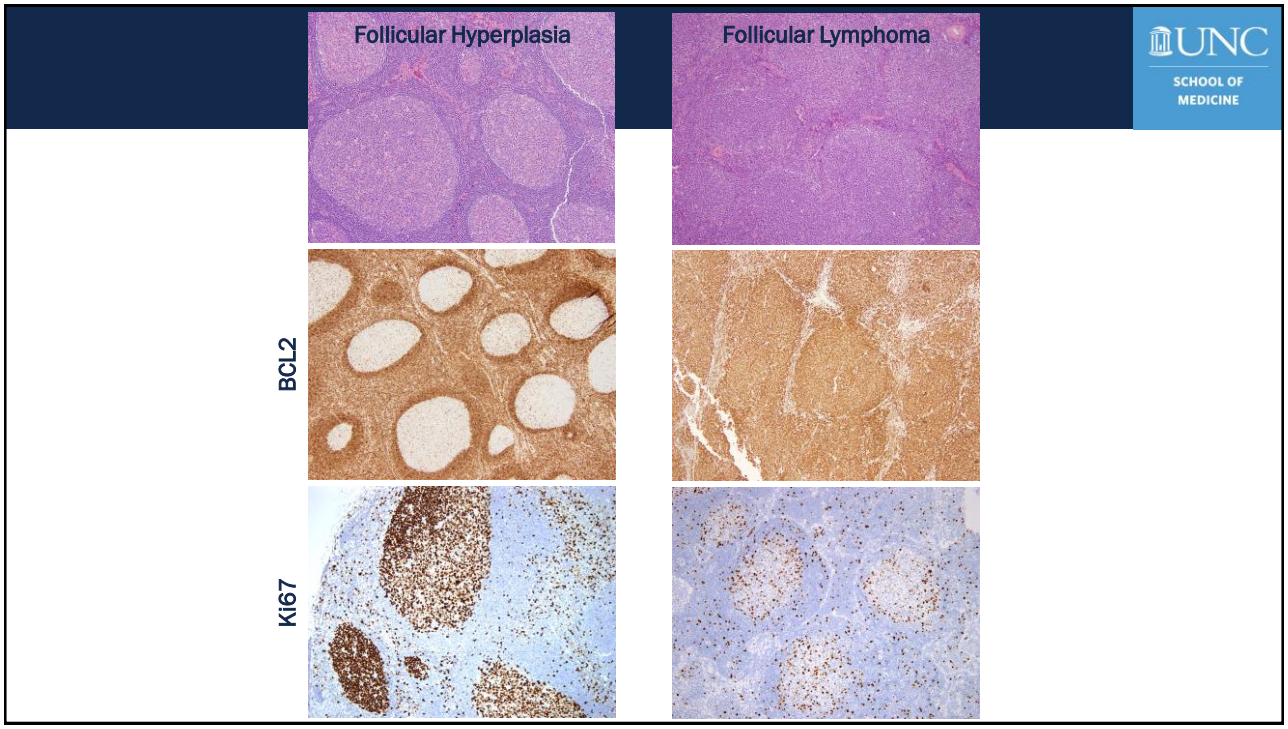


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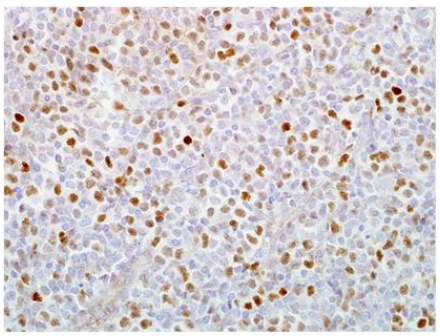
## … the staining is rarely "binary"

- Some stains work better than others
  - Biologic
  - Technical
- Reporting for many clinically actionable/important stains is subjective



cMYC expression:
- >40% is considered +
- What would YOU call this?

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# Other testing methods

- Karyotype (”routine cytogenetics”)
- Fluorescence *in situ* hybridization (FISH)
- Sequencing

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# Karyotype

- Culture cells → arrest in metaphase → stain
- Advantages:
  - Unbiased look at the entire genome
  - Identify large aberrations
- Disadvantages:
  - Poor resolution

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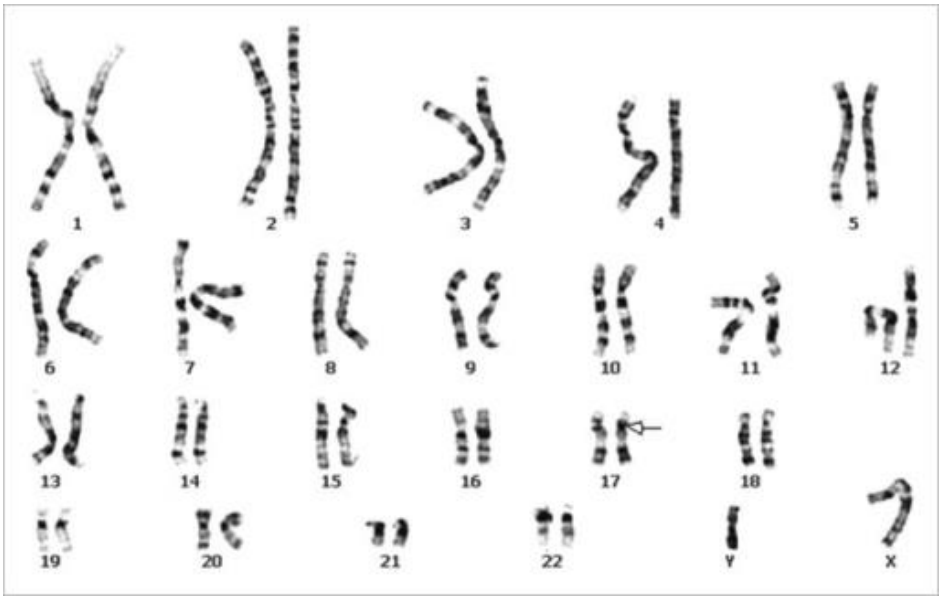


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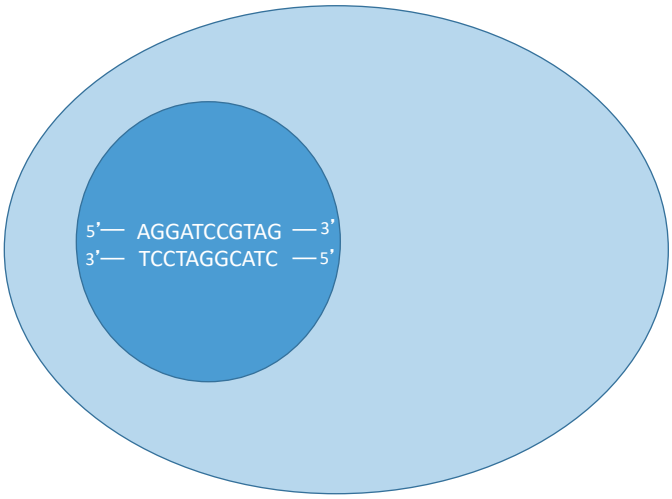
# Fluorescence *in situ* hybridization

- Fluorescent DNA probes are hybridized to specific sequences of interest

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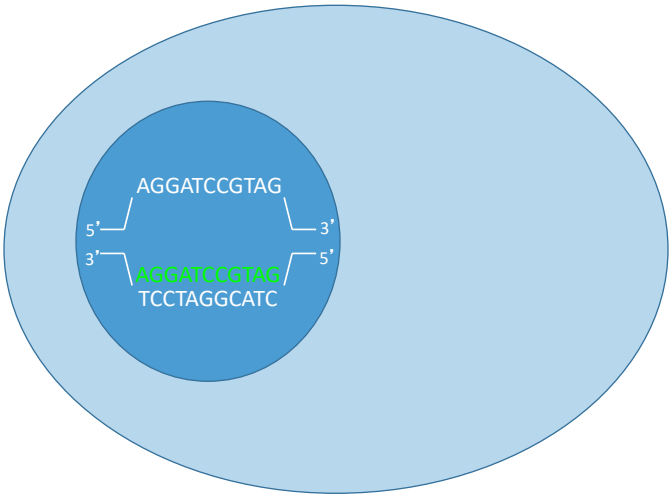


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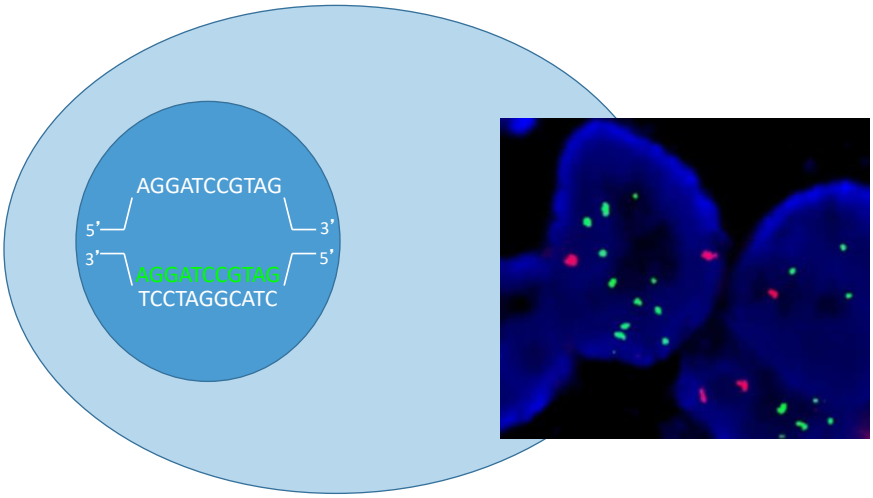
# Fluorescence *in situ* hybridization

- Fluorescent DNA probes are hybridized to specific sequences of interest

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# Fluorescence *in situ* hybridization

- Advantages:
  - Increased resolution compared to karyotype
- Disadvantages:
  - User defines the target

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# DNA Sequencing

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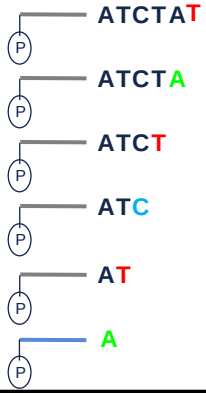
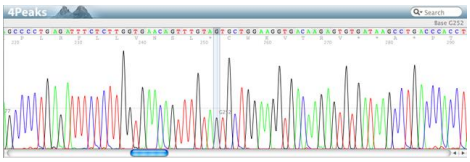
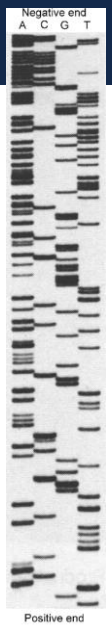
<u>Classical sequencing methodology – Sanger dideoxy sequencing</u>

- Permanent chain terminator method
- Template DNA, sequencing primer, DNA polymerase, deoxynucleotides (dA,dG,dT,dC) and labeled dideoxynucleotides (ddA, ddG, ddT, ddC) are all combined in a single reaction
- Sequencing is performed one reaction at a time

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# Evolution of testing

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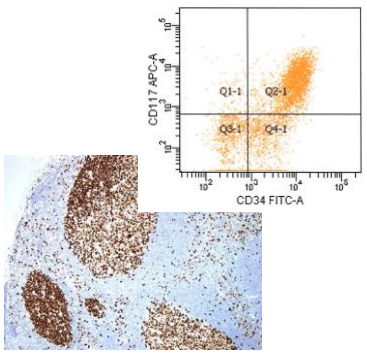
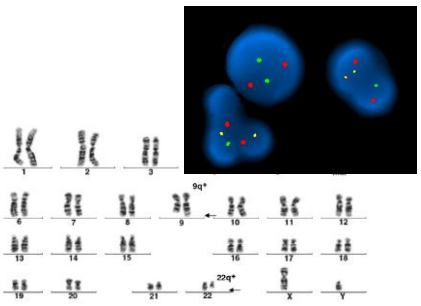
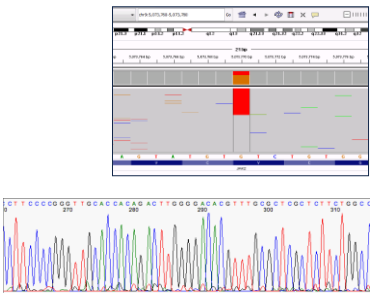



Immunophenotyping




Cytogenetics/FISH



Molecular Studies

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# Why is Uniform Classification Important?

- Patient Care
  - Diagnosis
  - Prognostic – outcome
  - Predictive – predict response to therapies
- Clinical Trials
- Public Health and Policy (accurate cancer registries)

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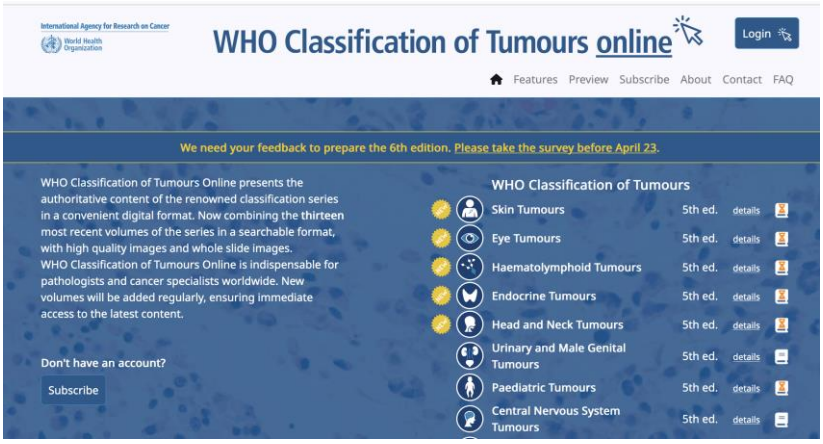
# Classification Systems

International Agency for Research on Cancer

World Health Organization




https://tumourclassification.iarc.who.int/welcome/

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# Classification of Myeloid Cancers

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**Myeloproliferative neoplasms**
Chronic myeloid leukemia, *BCR-ABL1+*
Chronic neutrophilic leukemia
Polycythemia vera
Primary myelofibrosis
Essential thrombocythemia
Chronic eosinophilic leukemia
MPN, unclassifiable

**Mastocytosis**
Cutaneous mastocytosis
Systemic mastocytosis

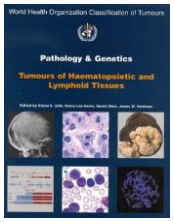
**Myeloid/lymphoid neoplasms with eosinophilia and abnormalities of *PDGFRA*, *PDGFRB*, *FGFR1*, or with *PCM1-JAK2***
Myeloid/lymphoid neoplasms with *PDGFRA* rearrangement
Myeloid/lymphoid neoplasms with *PDGFRB* rearrangement
Myeloid/lymphoid neoplasms with *FGFR1* rearrangement
Myeloid/lymphoid neoplasms with *PCM1-JAK2*

**MDS/MPN neoplasms**
CMML
Atypical CML
JMML
MDS/MPN with ring sideroblasts and thrombocytosis
MDS/MPN, unclassifiable

**Myelodysplastic syndrome**
MDS with single lineage dysplasia
MDS with ring sideroblasts
MDS with multilineage dysplasia
MDS with excess blasts
MDS with isolated del(5q)
MDS, unclassifiable
Refractory cytopenia of childhood

**Acute myeloid leukemia**
AML with t(8;21)
AML with inv(16)
AML with *PML-RARA*
AML with t(9;11)
AML with t(6;9)
AML with inv(3)
AML with t(1;22)
AML with *BCR-ABL1*
AML with mutated *NPM1*
AML with biallelic mutations of *CEBPA*
AML with mutated *RUNX1*
AML with myelodysplasia related changes
Therapy-related AML
AML, NOS

**Other myeloid malignancies**
Myeloid neoplasms with germline predisposition
Myeloid proliferations related to Down syndrome




Molecular/cytogenetic feature specifically part of diagnostic criteria

Molecular/cytogenetic feature not specifically part of the diagnostic criteria

Arber DA *et al.* *Blood* 2016. 127:2391-2405

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# Review of Referral Cases

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- Inconsistencies in diagnosis
  - Some could be true “errors”
  - Many reflect access to improved technologies, updated clinical history and imaging, new laboratory findings from presentation to referral, etc.
- Requirement for review of diagnostic material before treatment

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# Discordance with Non-Hodgkin Lymphoma Diagnoses

- National Comprehensive Cancer Network NHL database
- 731 patients with the 5 most common lymphoma types
- 43 (6%) were discordant from primary to NCCN center review
- 35 of 43 may have had a change in treatment!

- Depending on tumor type, discordance can be >25%

Comparison of Referring and Final Pathology for Patients With Non-Hodgkin's Lymphoma in the National Comprehensive Cancer Network
Ann S. LaCasce, Michelle E. Kho, Jonathan W. Friedberg, Joyce C. Niland, Gregory A. Abel, Maria Alma Rodriguez, Myron S. Czuczman, Michael M. Millenson, Andrew D. Zelenetz, and Jane C. Weeks
Journal of Clinical Oncology 2008 26:31, 5107-5112

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# Question 3

A study of human pancreatic tumors implanted into mice identifies a new prognostic biomarker by immunohistochemistry. The findings are reported in a high-impact journal and antibody for testing is available from the research lab. Can you use this test for clinical decision making?

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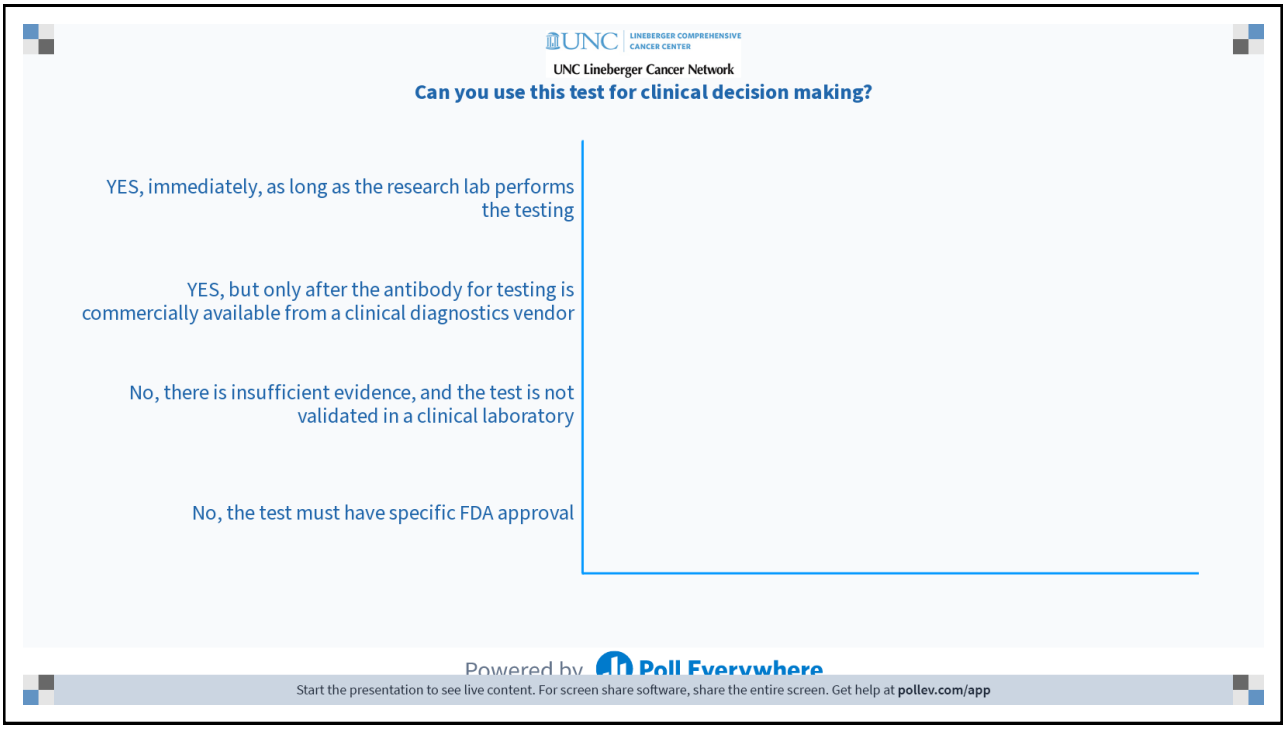


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# College of American Pathologists

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- Council on Accreditation
- Council on Education
- Council on Government and Professional Affairs
- Council on Membership and Professional Development
- **Council on Scientific Affairs**
  - Anatomic Pathology, Chemistry, Hematology, Informatics, Laboratory General, Molecular Pathology
- Committees of the Board of Governors

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# College of American Pathologists

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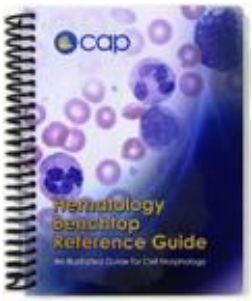
- Primary responsibilities:
  - Survey development and review (100's/year)
  - Revisions of inspection checklist
  - Glossary upkeep

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| Survey Description | 2014 A | 2014 B | 2014 C | 2014 year total | 2015 A | 2015 B | 2015 C | 2015 year total | 2016 A | 2016 B | 2016 C | 2016 year total | 2017 A | 2017 B | 2017 C | 2017 year total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABF1 - Automated Body Fluid, Bayer | 32 | 32 | | **64** | 36 | 35 | | **71** | 36 | 35 | | **71** | 41 | 40 | | **81** |
| ABF2 - Automated Body Fluid, Sysmex/Beckman | 1337 | 1337 | | **2674** | 1484 | 1483 | | **2967** | 1484 | 1483 | | **2967** | 1717 | 1717 | | **3434** |
| ABF3- Automated Body Fluid, Iris | 317 | 317 | | **634** | 339 | 330 | | **669** | 339 | 330 | | **669** | 348 | 343 | | **691** |
| AFL - Amniotic Fluid Leakage | 662 | 662 | | **1324** | 663 | 661 | | **1324** | 663 | 661 | | **1324** | 777 | 777 | | **1554** |
| APT - Fetal Hemoglobin | 404 | 403 | | **807** | 394 | 389 | | **783** | 394 | 389 | | **783** | 362 | 356 | | **718** |
| BCP - Blood Cell ID Photopages | 192 | 190 | 190 | **572** | 188 | 184 | 183 | **555** | 188 | 184 | 183 | **555** | 238 | 196 | 193 | **627** |
| BCP2 - Blood Cell ID, Limited | | | | | | | | | | | | | 116 | 114 | 114 | **344** |
| BCR - Bile Crystal | 91 | 91 | | **182** | 91 | 91 | | **182** | 91 | 91 | | **182** | 90 | 90 | | **180** |
| BFC- Body Fluid Crystals | 1737 | 1737 | | **3474** | 1820 | 1821 | | **3641** | 1820 | 1821 | | **3641** | 1869 | 1869 | | **3738** |
| BMD - Bone Marrow Differential | 312 | 312 | | **624** | 318 | 317 | | **635** | 318 | 317 | | **635** | 331 | 324 | | **655** |
| CMP- Clinical Microscopy Photopages | 5789 | 5840 | | **11629** | 5805 | 5827 | | **11632** | 5805 | 5827 | | **11632** | 4538 | 4538 | | **9076** |
| CMP1- Clinical Microscopy iCHEM Photopages | 575 | 578 | | **1153** | 903 | 997 | | **1900** | 903 | 997 | | **1900** | 1364 | 1393 | | **2757** |
| CMP2- Clinical Microscopy Urinalysis Basic | | | | | | | | | | | | | 1508 | 14574 | | **16082** |
| CMP3- Urinalysis with Clinical Microscopy Photopages | | | | | | | | | | | | | 13335 | 1313 | | **14648** |
| CMMP- Clinical Microscopy Misc. Photopages and CD | 3987 | 3988 | | **7975** | 4129 | 4147 | | **8276** | 4129 | 4147 | | **8276** | 4590 | 4563 | | **9153** |
| DSC - Dipstick Confirmatory Testing | 1497 | 1497 | | **2994** | 1374 | 1373 | | **2747** | 1374 | 1373 | | **2747** | 1152 | 1150 | | **2302** |
| EHE1 - Extended Hematology Exercise | 236 | 236 | | **472** | 217 | 215 | | **432** | 217 | 215 | | **432** | 245 | 244 | | **489** |
| ESR - Erythrocyte Sedimentation Rate (ESR) | 3810 | 3809 | | **7619** | 3942 | 3938 | | **7880** | 3942 | 3938 | | **7880** | 4010 | 3996 | | **8006** |
| ESR1 - ESR Sedimat 15 | 581 | 581 | | **1162** | 543 | 541 | | **1084** | 543 | 541 | | **1084** | 475 | 472 | | **947** |
| ESR2-Alifax | 68 | 68 | | **136** | 116 | 116 | | **232** | 116 | 116 | | **232** | 193 | 193 | | **386** |
| ESR3-ALCOR | 33 | 33 | | **66** | 95 | 95 | | **190** | 95 | 95 | | **190** | 328 | 338 | | **666** |
| FH1 - Hematology and Differential | 267 | 266 | 266 | **799** | 317 | 333 | 331 | **981** | 317 | 333 | 331 | **981** | 529 | 527 | 524 | **1580** |
| FH1P - Hematology and Differential Photopages | 72 | 72 | 72 | **216** | 81 | 86 | 86 | **253** | 81 | 86 | 86 | **253** | 168 | 163 | 161 | **492** |
| FH2 - Hematology and Differential | 185 | 185 | 185 | **555** | 178 | 196 | 195 | **569** | 178 | 196 | 195 | **569** | 450 | 447 | 443 | **1340** |
| FH2P - Hematology and Differential Photopages | 66 | 66 | 66 | **198** | 58 | 56 | 55 | **169** | 58 | 56 | 55 | **169** | 161 | 163 | 163 | **487** |
| FH3 - Hematology and Differential | 97 | 97 | 97 | **291** | 108 | 109 | 109 | **326** | 108 | 109 | 109 | **326** | 107 | 109 | 109 | **325** |
| FH3P - Hematology and Differential Photopages | 315 | 318 | 318 | **951** | 303 | 306 | 302 | **911** | 303 | 306 | 302 | **911** | 228 | 230 | 229 | **687** |
| FH4 - Hematology and Differential | 72 | 68 | 67 | **207** | 70 | 81 | 81 | **232** | 70 | 81 | 81 | **232** | 61 | 59 | 59 | **179** |
| FH4P - Hematology and Differential Photopages | 318 | 295 | 299 | **912** | 262 | 274 | 274 | **810** | 262 | 274 | 274 | **810** | 200 | 197 | 197 | **594** |
| FH6 - Hematology and Differential | 261 | 261 | 259 | **781** | 309 | 311 | 308 | **928** | 309 | 311 | 308 | **928** | 70 | 60 | 59 | **189** |
| FH6P - Hematology and Differential Photopages | 2082 | 2089 | 2089 | **6260** | 2015 | 2053 | 2038 | **6106** | 2015 | 2053 | 2038 | **6106** | 392 | 325 | 322 | **1039** |
| FH9 - Hematology and Differential | 568 | 517 | 517 | **1602** | 665 | 676 | 667 | **2008** | 665 | 676 | 667 | **2008** | 761 | 750 | 742 | **2253** |

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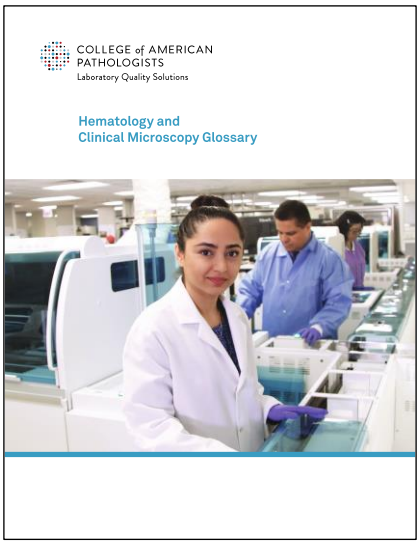
# CAP Glossary




**Hematology Blood Cell Identification Master List**

*Important:* Consult the current *Hematology and Clinical Microscopy Glossary*, which can be accessed at cap.org, for brief descriptions or definitions.
*Note:* Please read the history that accompanies the photographs or whole slide images before making your selection. If microorganisms, inclusions, or other intracellular findings are seen, choose an identification that indicates their presence.

108 Immature or abnormal cell, would refer for identification (Code 108 should be used **only** if you would routinely send the cell in question to an outside laboratory with another CLIA number.)

**Erythrocytes**
140 Acanthocyte (spur cell)
245 Bite cell (degmacyte)
299 Blister cell/Prekeratocyte
287 Echinocyte (burr cell, crenated cell)
135 Erythrocyte, normal
279 Erythrocyte with overlying platelet
288 Fragmented red blood cell (schistocyte, helmet cell, keratocyte, triangular cell)
298 Hypochromasia
229 Macrocyte, oval or round (excluding polychromatophilic red blood cell)
249 Microcyte (with increased central pallor)
253 Nucleated red blood cell, normal or abnormal morphology
146 Ovalocyte (elliptocyte)
134 Polychromatophilic (non-nucleated) red blood cell
178 Red blood cell agglutinates
188 Rouleaux
147 Sickle cell (drepanocyte)
148 Spherocyte
149 Stomatocyte
150 Target cell (codocyte)
151 Teardrop cell (dacrocyte)

**Erythrocyte Inclusions**
152 Basophilic stippling (coarse)
153 Hemoglobin C crystal
155 Howell-Jolly body
157 Pappenheimer bodies (iron or Wright stain)

**Granulocytes and Monocytes**
208 Basophil, any stage
209 Eosinophil, any stage
117 Mast cell
236 Monocyte
237 Monocyte, immature (promonocyte, monoblast)
284 Neutrophil, segmented or band
259 Neutrophil, toxic (to include toxic granulation and/or Döhle bodies, and/or toxic vacuolization)
122 Neutrophil with hypersegmented nucleus
240 Neutrophil with Pelger-Huët nucleus (acquired or congenital)
161 Neutrophil, polyploid
239 Neutrophil with dysplastic nucleus and/or hypogranular cytoplasm
191 Neutrophil necrobiosis (degenerated neutrophil)
121 Neutrophil, giant band or giant metamyelocyte
112 Neutrophil, metamyelocyte
111 Neutrophil, myelocyte
241 Neutrophil, promyelocyte
238 Neutrophil, promyelocyte, abnormal with/without Auer rod(s)
246 Myeloblast with Auer rod

**Lymphocytes and Plasma Cells**
265 Lymphocyte
307 Lymphocyte, large granular
266 Lymphocyte, reactive (includes plasmacytoid and immunoblastic forms)
162 Malignant lymphoid cell (other than blast)
223 Plasma cell, morphologically mature/abnormal/containing inclusion (eg, Dutcher body, Russell body)

**Megakaryocytes and Platelets**
279 Erythrocyte with overlying platelet
212 Megakaryocyte (normal, abnormal, or nuclear fragment)t
263 Platelet, giant (macrothrombocyte)
285 Platelet, hypogranular
171 Platelet, normal
264 Platelet satellitism

**Microorganisms**
282 *Babesia* sp.
268 Bacteria (cocci or rod), extracellular
269 Bacteria (spirochete), extracellular
270 Fungi, extracellular
196 Leukocyte with intracellular *Anaplasma/Ehrlichia*
271 Leukocyte with intracellular bacteriai
231 Leukocyte with intracellular fungi
283 Microfilaria
156 *Plasmodium* sp. (malaria)
233 Protozoa (non-malarial)
311 Parasite(s) seen, referred for definitive identification (Code 311 should be used only if you would routinely send cell in question to an outside laboratory with another CLIA number)

**Miscellaneous**
174 Blast cell
200 Cryoglobulin
118 Leukocyte containing Alder (Alder-Reilly) anomaly inclusion(s)
119 Leukocyte containing Chediak-Higashi anomaly inclusion(s)
184 Metastatic tumor cell or tumor cell clump
204 Mitotic figure
213 Squamous epithelial cell/endothelial cell

**Artifact**
192 Basket cell/smudge cell
220 Stain precipitate

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# Synoptic Reporting for Cancer Diagnosis

College of American Pathologists (CAP)

- One of the leading pathology organizations
- Oversee laboratory accreditation (… more on this soon!)
- Many studies in the 90's revealed significant variation in cancer reporting → CAP cancer committee reporting checklists

https://www.cap.org/protocols-and-guidelines/cancer-reporting-tools/cancer-protocol-templates

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COLLEGE of AMERICAN PATHOLOGISTS

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**Protocol for the Examination of Specimens from Patients with Cutaneous Squamous Cell Carcinoma of the Head and Neck**

**Procedure (select all that apply)**
___ Excision, ellipse
___ Excision, wide
___ Excision, other (specify): _____
___ Re-excision, ellipse
___ Re-excision, wide
___ Re-excision, other (specify): _____
___ Lymphadenectomy, sentinel node(s)
___ Lymphadenectomy, regional nodes (specify): _____
___ Other (specify): _____
___ Not specified

**TUMOR**

**Tumor Focality**
___ Unifocal
___ Multifocal: _____
___ Cannot be determined: _____

**Multiple Primary Sites**
___ Not applicable (no additional primary site(s) present)
___ Present: _____
*Please complete a separate checklist for each primary site if required as above.*

**Tumor Site**
___ Specify site: _____
___ Not specified

**Tumor Laterality (select all that apply)**
___ Right
___ Left
___ Midline
___ Not specified

**Histologic Type (Note B)**
___ Squamous cell carcinoma, not otherwise specified
___ Keratoacanthoma
___ Acantholytic squamous cell carcinoma
___ Spindle cell squamous cell carcinoma
___ Verrucous squamous cell carcinoma
___ Adenosquamous carcinoma
___ Clear cell squamous cell carcinoma
___ Squamous cell carcinoma with sarcomatoid differentiation
___ Squamous cell carcinoma with osteoclast-like giant cells
___ Pseudovascular squamous cell carcinoma
___ Lymphoepithelioma-like carcinoma
___ Other (specify): _____

**Histologic Grade (Note C)**
___ GX: Cannot be assessed
___ G1: Well differentiated
___ G2: Moderately differentiated
___ G3: Poorly differentiated
___ G4: Undifferentiated
___ Other (specify): _____
___ Not applicable

**Tumor Depth of Invasion (DOI) (Note D)**
___ Not applicable
___ Specify depth in Millimeters (mm): _____ mm
___ At least (mm): _____ mm
___ Cannot be determined (explain): _____

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# Synoptic Reporting for Cancer Diagnosis

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- Checklists improve completeness
- Improved accuracy (to a point)

- For those who read them:
  - Consistent formatting
  - Columned vs. justified
  - Single-line vs. multiple lined

Synoptic Reporting: Evidence-Based Review and Future Directions
Andrew A. Renshaw, Mercy Mena-Allauca, Edwin W. Gould, and S. Joseph Sirintrapun
JCO Clinical Cancer Informatics 2018 :2, 1-9

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# Tissue Sampling for Diagnosis

- Specimen adequacy is a major challenge in clinical practice
- Limited sampling can lead to missed or delayed diagnosis
- Insufficient tissue for study enrollment or correlative science

- In response to the trend, other diagnostic methods (liquid biopsies, etc) are being developed

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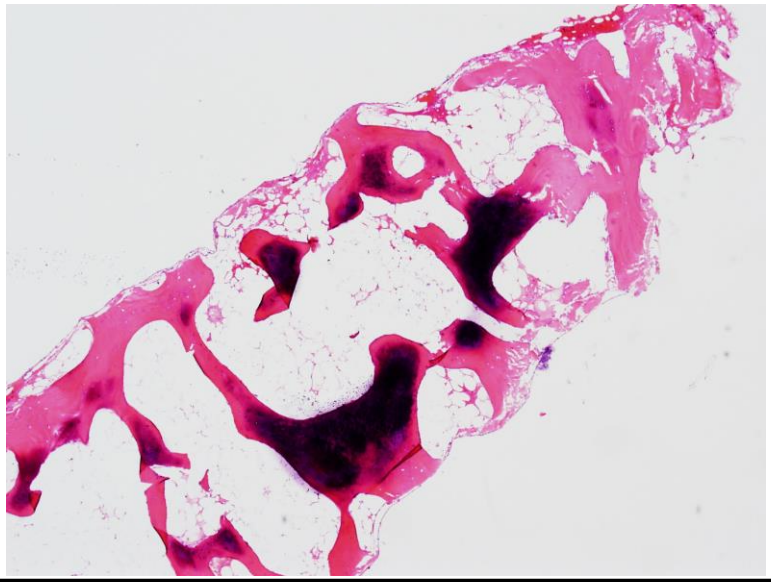
# Bone marrow biopsy

**Hypocellular bone marrow?**
- Aplastic anemia
- Drug/toxin effect
- Hypocellular MDS
- GVHD



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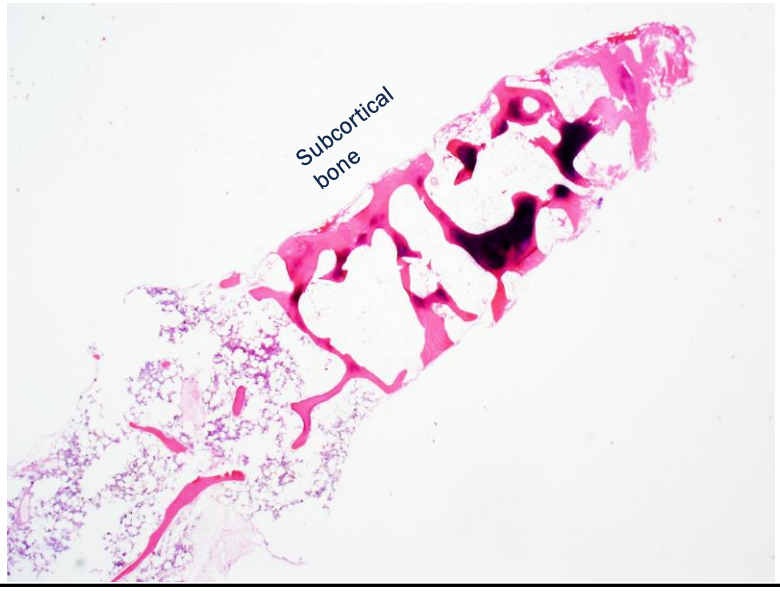
# Bone marrow biopsy

... or maybe not!?!

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# Fine Needle Aspirate vs Tissue Biopsy

- Advantages of FNA
  - Simple procedure
  - Low morbidity
  - Efficiently guides patient triage
- Disadvantages of FNA
  - Sampling
  - No histologic architecture
  - Frequently needs follow-up excisional biopsy

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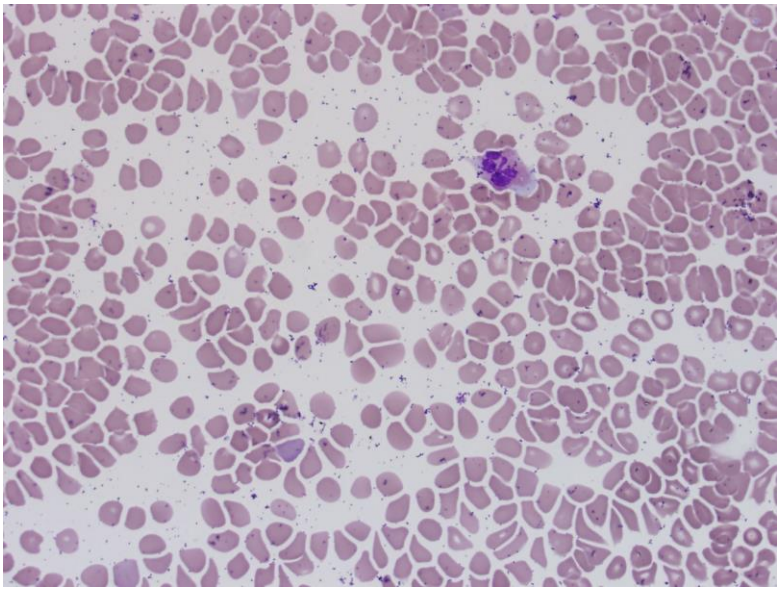
# FNA – 5cm axillary lymph node



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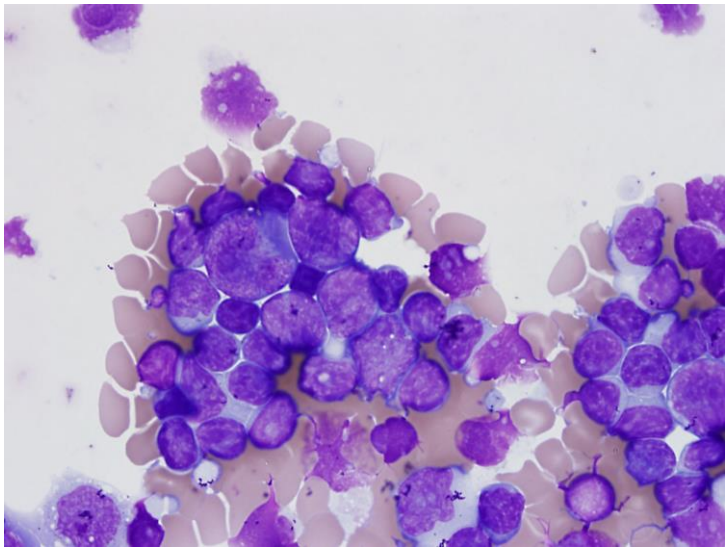
# Follow-up FNA: Lymphoma



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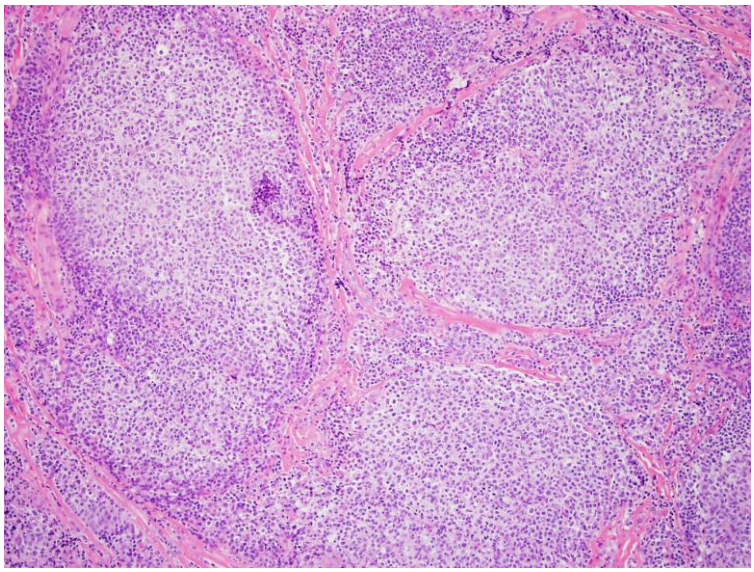
# Excisional biopsy – Follicular Lymphoma



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# Conclusions

- Effective cancer care requires accurate pathologic diagnosis
- Testing methods have evolved that reflect our understanding of cancer biology and allow for improved reporting of prognostic and predictive biomarkers
- While new technologies are being developed to do 'more with less' adequate tissue biopsies are necessary (perhaps more than ever before)
- Synoptic reporting allows for discrete data elements to be provided for consistency and data collection.

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UNC LINEBERGER COMPREHENSIVE CANCER CENTER
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Questions/Comments?
Powered by Poll Everywhere
Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

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THANK YOU!

University Cancer Research Fund

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## UNC Lineberger Cancer Network

### The Telehealth Team

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**Veneranda Obure,** Technology Support Specialist
**Jon Powell, PhD,** Continuing Education Specialist
**Oliver Marth,** Technology Support Technician

**Andrew Dodgson, DPT,** Continuing Education Specialist
**Nadja Brown,** Interim Administrative Support Specialist
**Patrick Muscarella,** Technology Support Technician

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UPCOMING LIVE WEBINARS


ADVANCED PRACTICE PROVIDER
Live Webinar

**May 17**
**4:00 PM**

Oncologic Emergencies: Neutropenic Fever, Cord Compression, Tumor Lysis Syndrome
**Laura Blanchard,** MPAP, PA-C


RESEARCH TO PRACTICE
Live Webinar

**May 24**
**12:00 PM**

Radiation Oncology Management of Lung Cancer in NC: Update on Small-Cell Lung Cancer
**Ashley Weiner,** MD, PhD


PATIENT CENTERED CARE
Live Webinar

**June 14**
**12:00 PM**

Psychotherapy for Cancer-Related Distress
**Melissa Holt,** DNP, PMHNP-BC, MSW
**Lisa Stewart,** Psy.D.

*Complete details on upcoming Live Webinars:*
learn.unclcn.org/live-webinars

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## SELF-PACED, ONLINE COURSES


ADVANCED PRACTICE PROVIDER
Self-Paced, Online Course

What Is Cancer Rehabilitation and How Can it Help My Patients
**Sasha Knowlton,** MD


RESEARCH TO PRACTICE
Self-Paced, Online Course

Clinical Updates in Breast Oncology
**Emily Ray,** MD, MPH


PATIENT CENTERED CARE
Self-Paced, Online Course

Integrating the Caregiver as a Member of the Multidisciplinary Care Team
**Erin E. Kent,** PhD, MSc
**Loretta Muss,** RN, BA

*Complete details on upcoming Live Webinars:*
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## THANK YOU FOR PARTICIPATING!

**UNC Lineberger Cancer Network**

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Call: **(919) 445-1000**

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