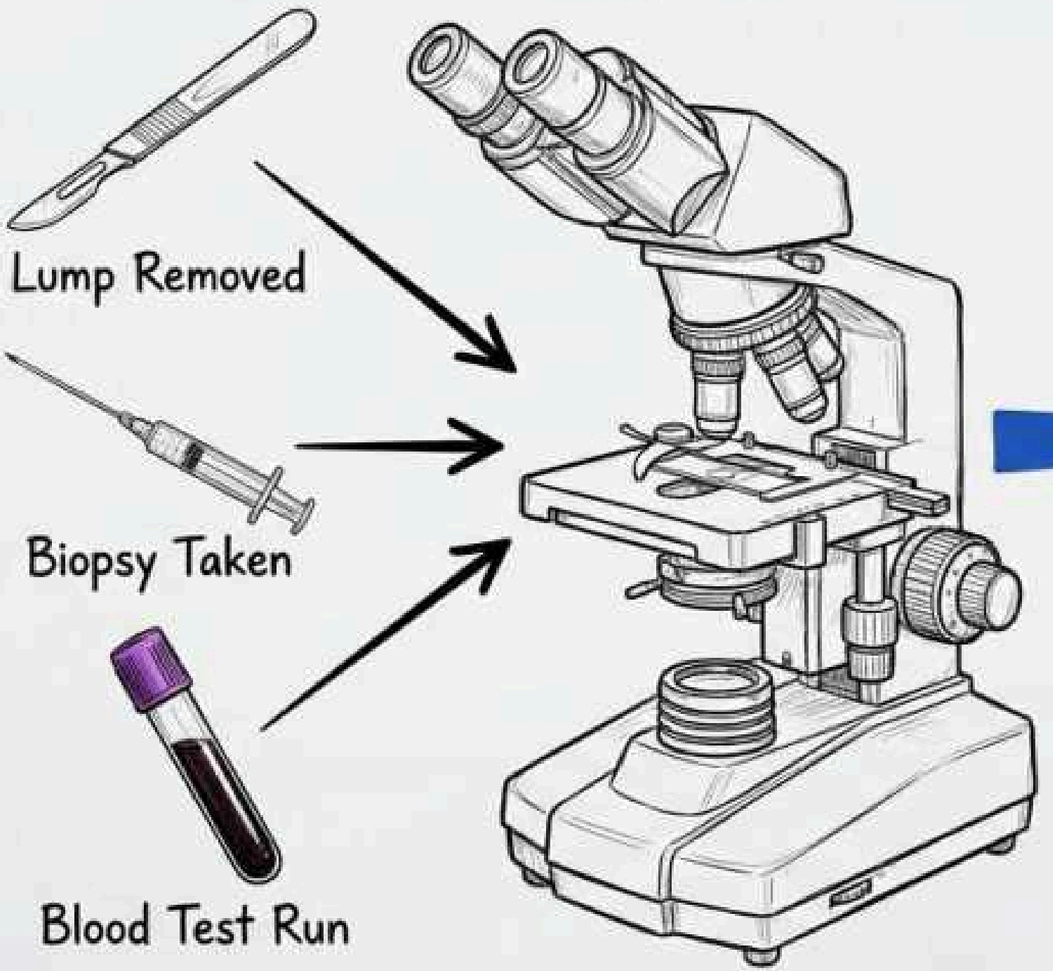
The Pathologist's Role in Medical Decisions

¶ 5.1

Most patients never meet their pathologist.

Yet, pathologists pathologists dictate a massive share of medical decisions.



Final Diagnosis

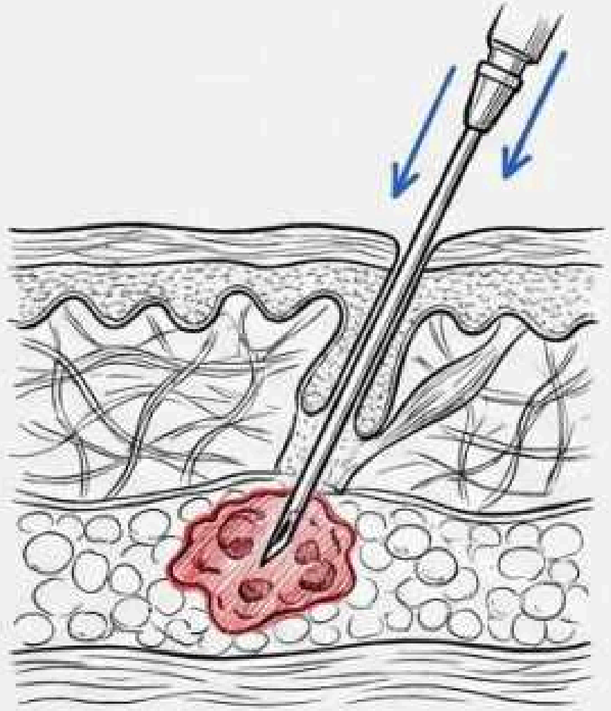


Pathology = The specialty that makes diagnoses final.

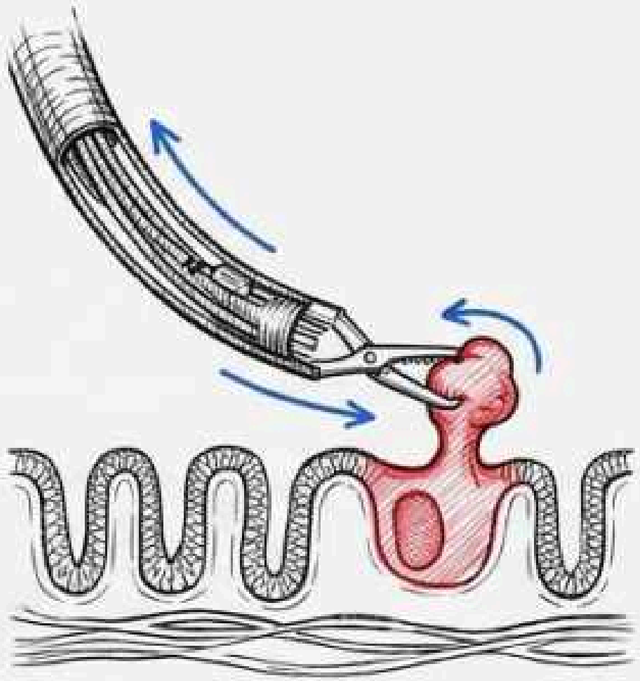
Gathering the Evidence: Biopsies & Surgical Resections

¶ 5.2

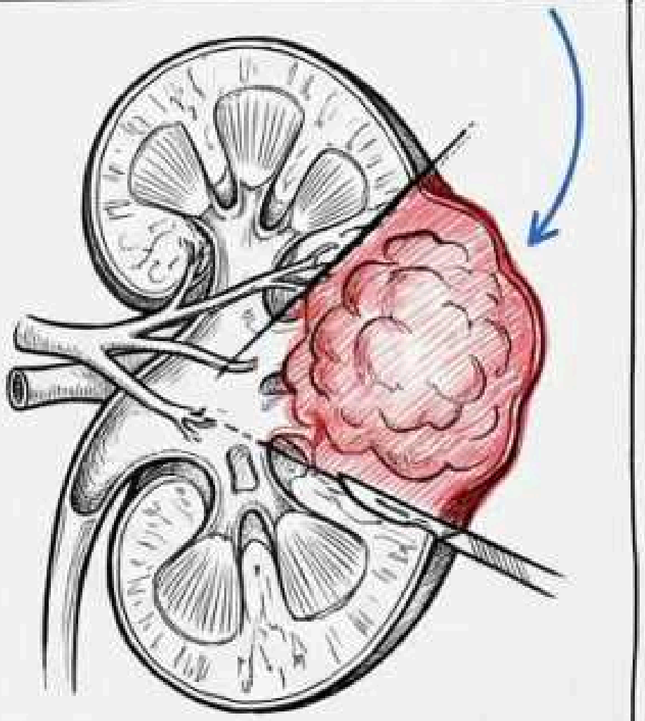
Needle Biopsy
(Small tissue sample)



Endoscopic Biopsy
(Via flexible tube)



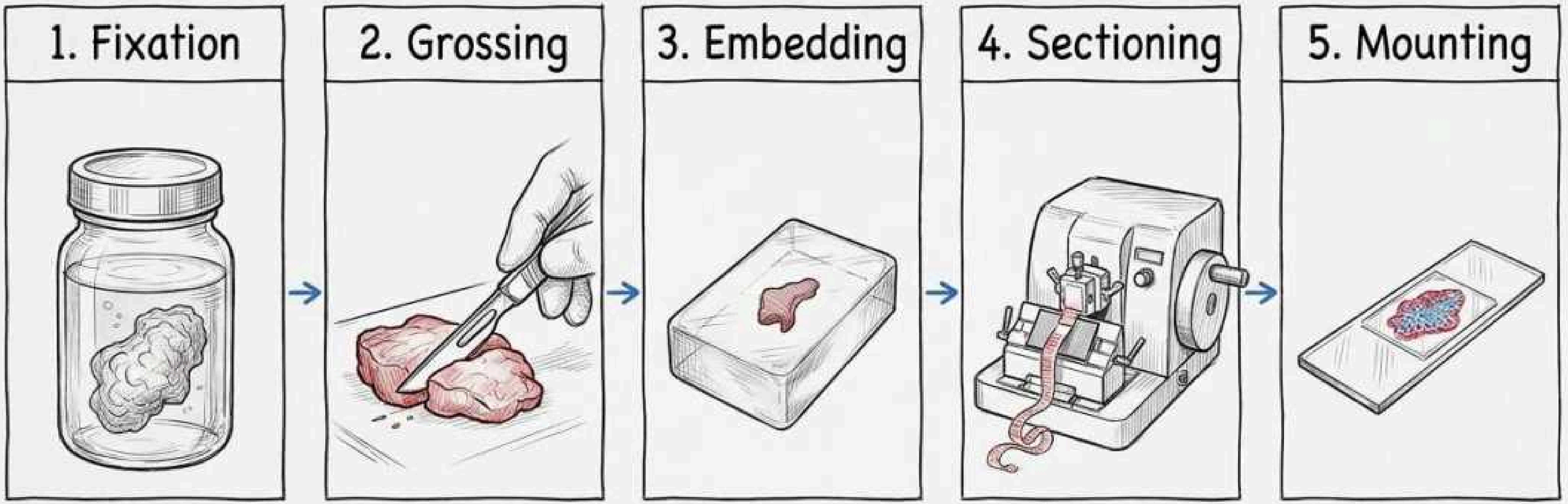
Surgical Resection
(Whole tumor or organ)



Crucial Input: Every specimen arrives in the lab coupled with the patient's history and a specific clinical question from the treating doctor.

The Tissue Preparation Pipeline

¶ 5.3



1. Fixation

Placed in Formalin. Stops decay, holds structure.

2. Grossing

Naked-eye exam & selection.

3. Embedding

Set in paraffin wax.

4. Sectioning

Cut to thousandths of a mm.

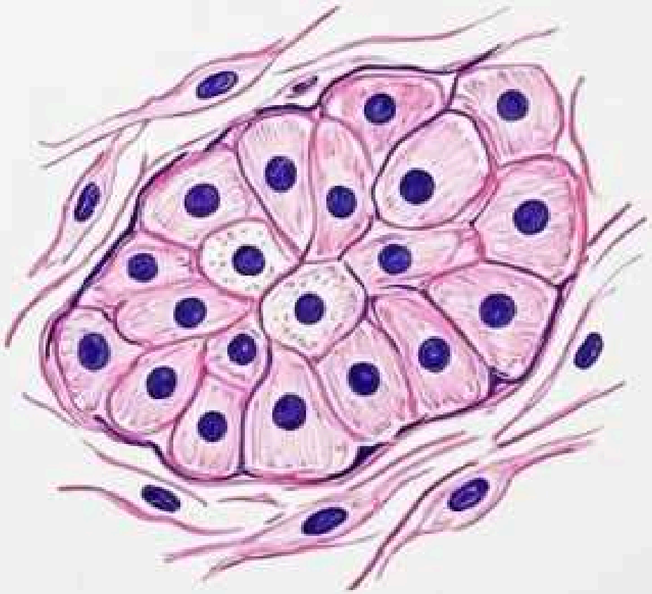
5. Mounting

Mounted on glass & stained.

Total Time: 1+ Days

H & E: The Diagnostic Workhorse

Haematoxylin + **Eosin** =



Targets Nuclei

Targets Cytoplasm & other structures

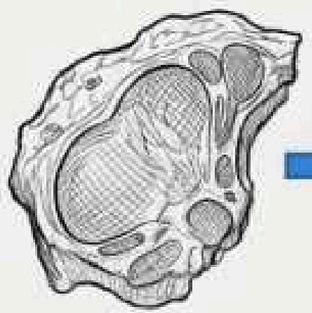
Unchanged for >100 years.
Allows pathologists to recognize:

- Normal tissue
- Inflammation & Infection
- Cell death
- Tumors

Time-Critical Diagnostics: The Frozen Section

¶ 5.5

Used when answers are needed during surgery (e.g., Are the tumor margins completely clear?).



Tissue Specimen

Standard Processing

Tissue → Formalin → Wax → Wait 24+ Hours → Detailed Final Diagnosis

Frozen Section

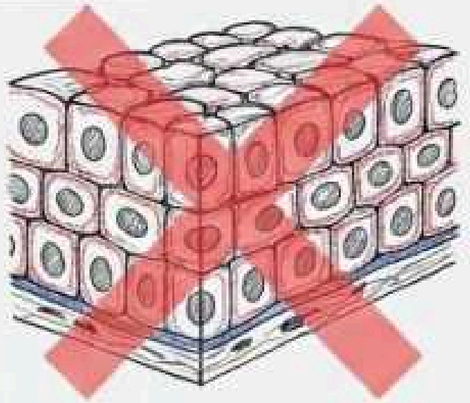
Tissue → Quickly Frozen → Cut & Stained → 20 Minutes → **Provisional Diagnosis** (Made while patient is under anesthesia)

Frozen sections are less detailed. The final diagnosis is confirmed later via standard processing.

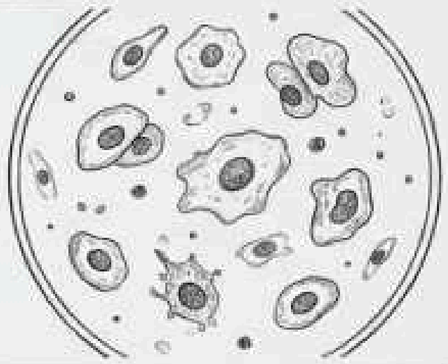
Cytology: Analyzing Individual Cells

¶ 5.6

Histology (Solid Tissue)

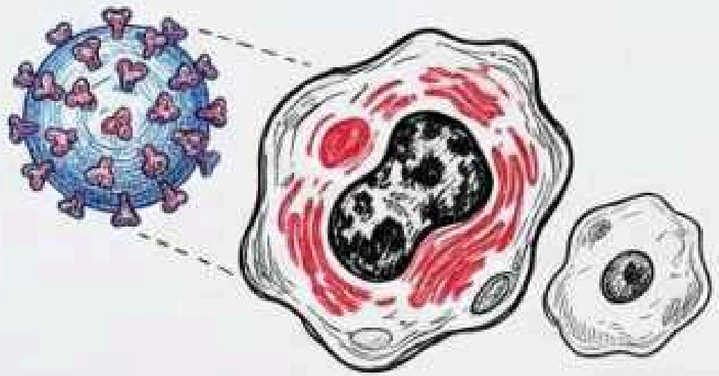


Cytology (Individual Cells)



- Collection methods: Scraping, Brushing, Fine-Needle Aspiration.

Case Study: The Pap Test & Cervical Screening

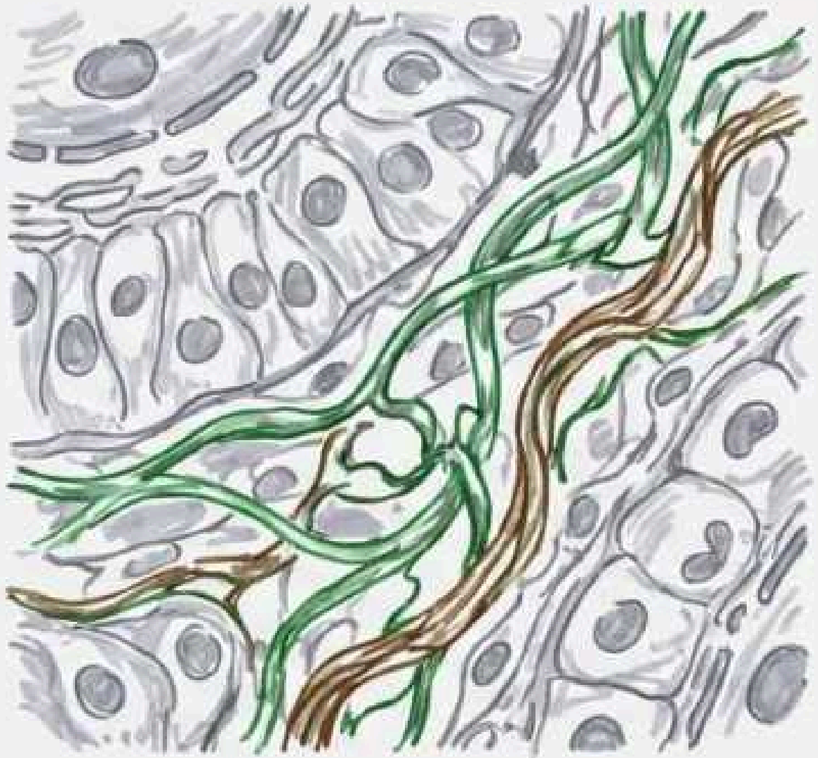


- Developed by George Papanicolaou (Mid-20th Century).
- Detects abnormal cells before cancer develops.
- Combined with HPV testing = Massive reduction in cervical cancer deaths.

Advanced Techniques: When H&E Isn't Enough

¶ 5.7

Special Stains



Highlights specific microbes, fibres, or deposits.

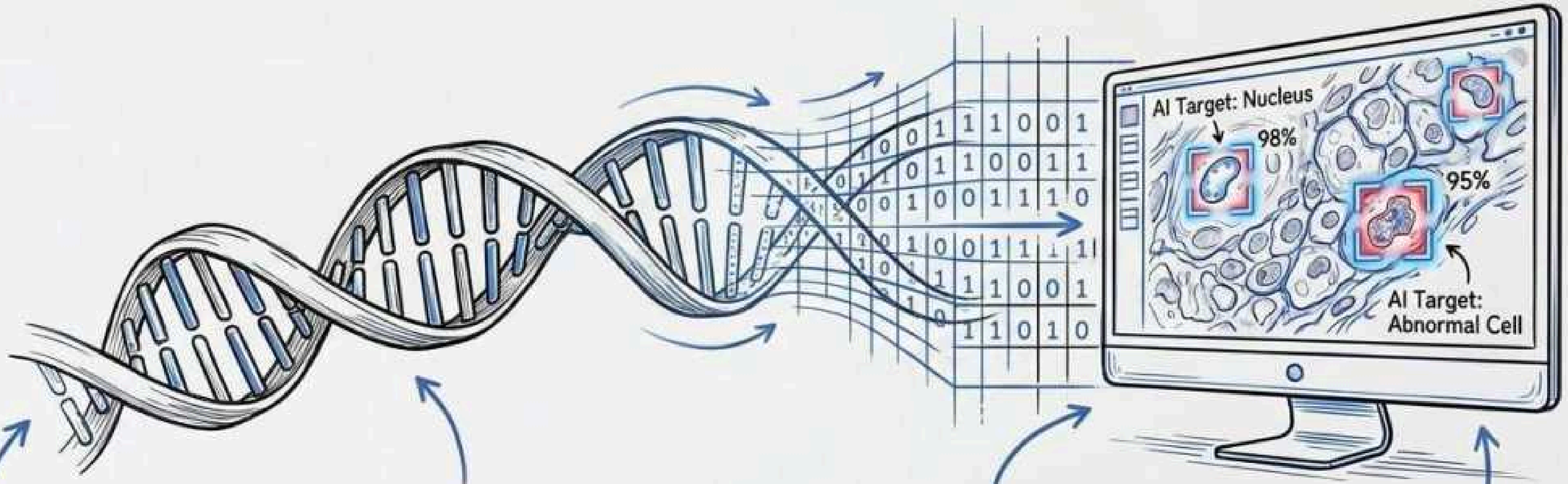
Immunohistochemistry (IHC)



Reveals tumor origin & specific treatment targets (e.g., hormone receptors in breast cancer).

Molecular & Digital Pathology

¶ 5.8



Molecular Pathology (DNA/RNA)

- Identifies cancer-driving genetic changes.
- Detects infections.
- Finds inherited variants (Links to MED 503 B).
- Directs modern cancer treatments.

Digital Pathology

- Glass slides scanned to digital screens.
- Future: AI/Computer methods assist in image analysis.

The Clinical Laboratory Ecosystem

¶ 5.9

Clinical Biochemistry

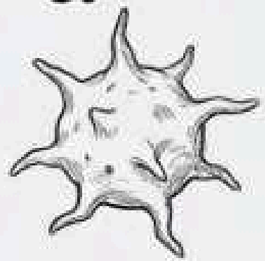
(Links to MED 502 B)



Blood chemistry tests.

Haematology

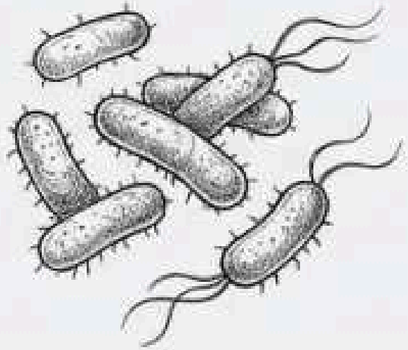




Blood cells and clotting.

Blood & Body Fluids

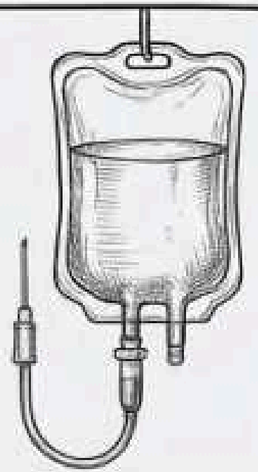
Microbiology



Identification of infections.

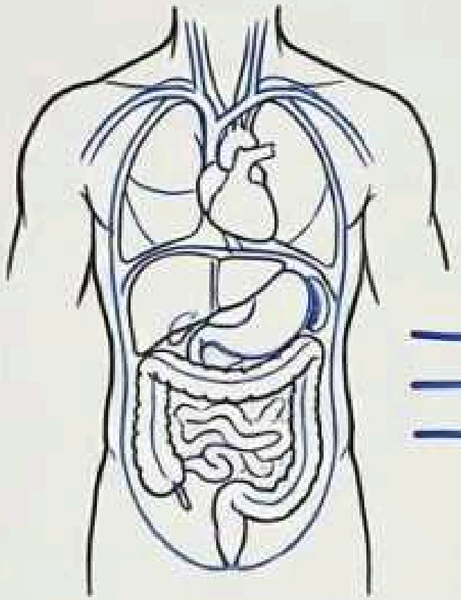
Transfusion Medicine

Safely matching blood for transfusion.



Mostly automated by machines. Quality checked and interpreted by laboratory scientists and pathologists.

The Ultimate Check: The Autopsy



Core Goals

Establish exact cause of death.
Reveal conditions missed in life.
Check diagnostic accuracy.

Historical Note: Once the primary way medicine learned about disease.

Value Loops

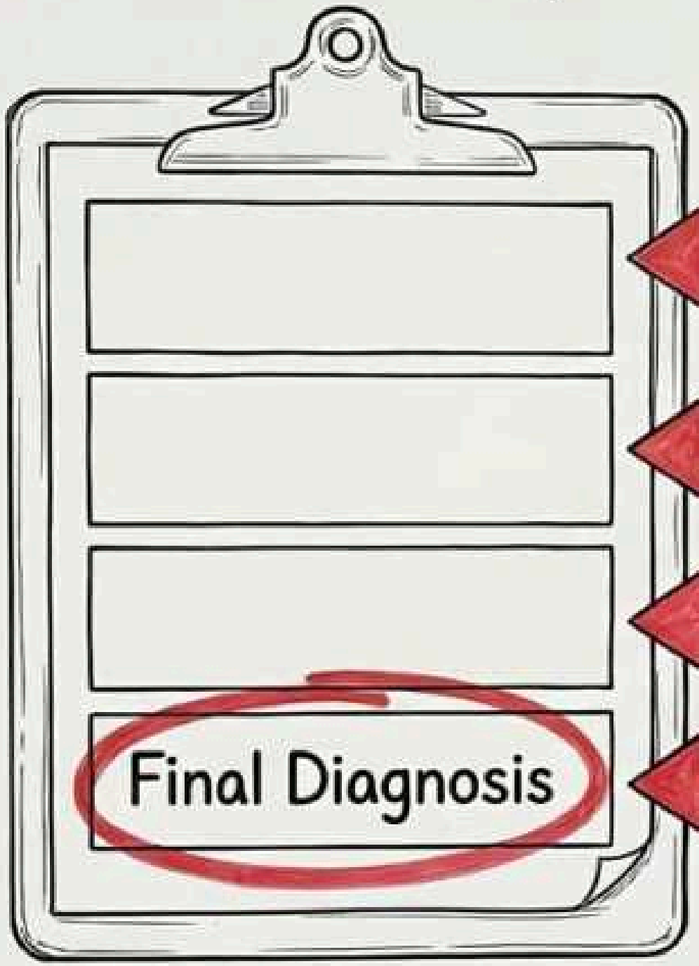
Information for Families
(Closure, inherited risk)

Public Health
(Tracking disease patterns)

The Courts
(Forensic pathology for legal questions)

¶ 5.11

The Final Output: The Pathology Report



Gross Description: What was received & seen with the naked eye.

Microscopic Description: Cellular findings from H&E.

Special Tests: IHC, molecular, etc.

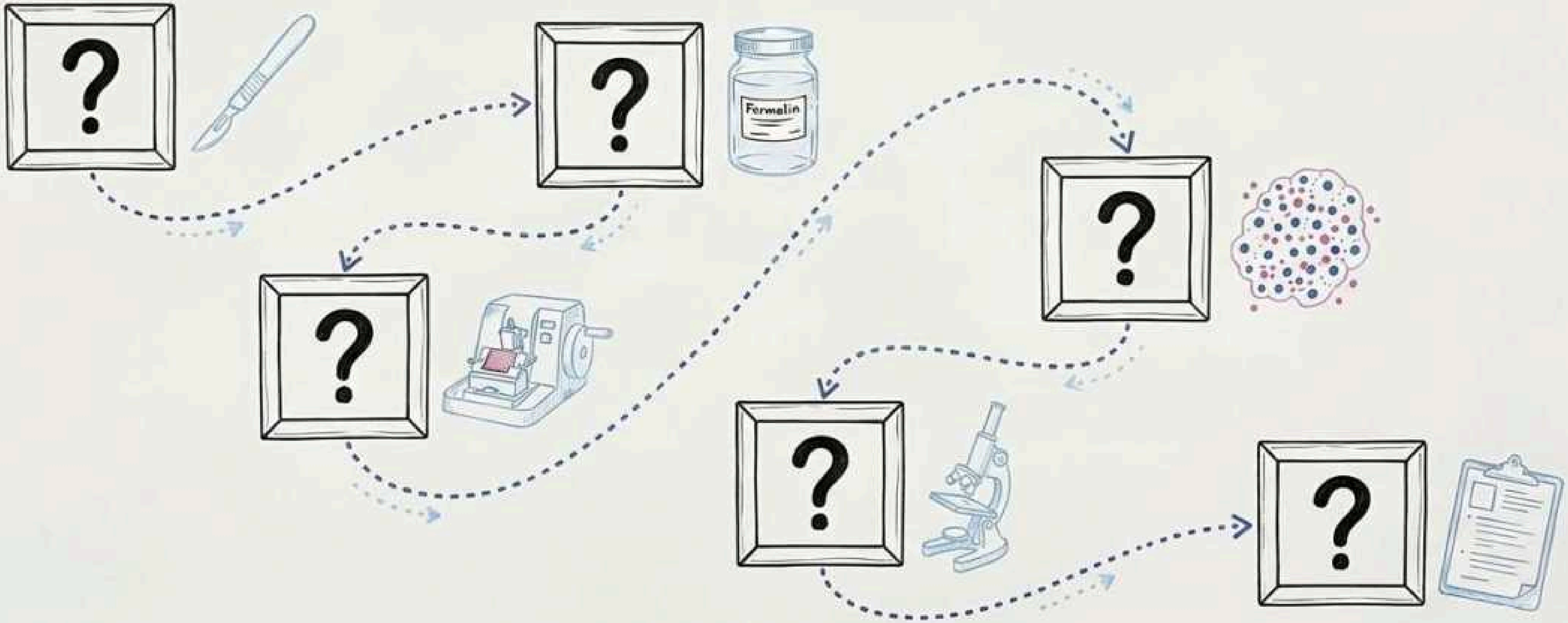
Final Diagnosis: Includes grade, stage, and comments.

CRUCIAL RULE: Written in precise technical language for DOCTORS, not patients. The ordering doctor is responsible for translating and explaining these results to the patient.

Lecture Challenge: The Journey of a Skin Biopsy

¶ 5.12

Follow a skin biopsy from the moment it is taken to the final diagnosis. What are the steps, and what does each achieve?

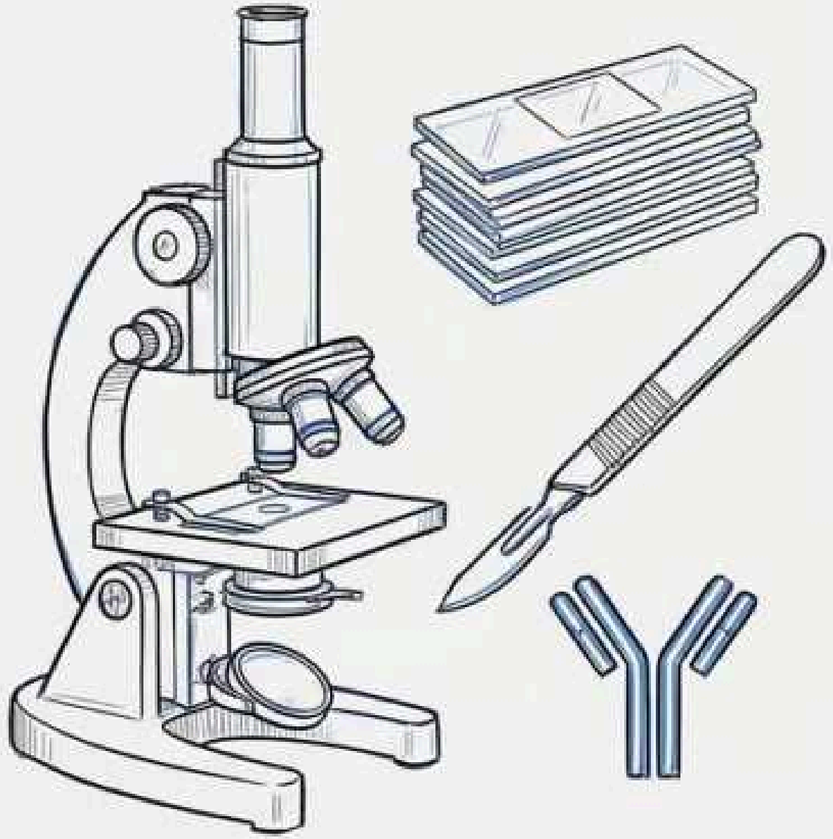


Looking Ahead: Bringing It All Together

¶ 5.13

In the next lecture, we apply the tools and concepts of MED 505 B to the pathology of the most common and serious diseases in medicine.

The Toolkit



The Application

