Learning how to learn

Knowledge management & Pattern recognition

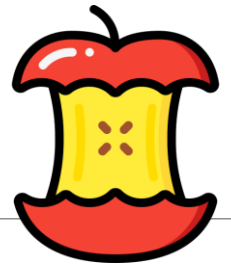
YEAR 1-2 REGISTRARS 23 JUNE 2023

NCPTS
National Cervical Pathology Training Service

Dr Amanda Charlton
Pathologist
LabPlus
Auckland City Hospital

A/Prof Diane Kenwright
Pathologist
Dept of Pathology and Molecular Medicine
University of Otago, Wellington

Knowledge management

Knowledge management  steps

Capture

Organise

Retrieve

Capture

Analogue

Lecture
Double header session
Physical textbook
eTextbook
Journal article paper
Website
Videos
Digital slides
Glass slides

Digital

Webinar/online presentation
eTextbook
Journal article pdf
Digital slides
QAP cases

Capture: Effective reading and note taking

STUDY STRATEGY DEFICIENCIES

Incomplete materials

Disorganised

Piecemeal

Ineffective study strategies

EFFECTIVE READING AND NOTE TAKING

SQ3R

Cornell notes

https://physicianbound.com/2019/05/barbara-oakleys-improve-your-study-skills-how-to-excel-at-math-and-science-even-if-you-flunked-algebra-part-2/

Ineffective study strategies

Table 2. Common Pitfalls, Tips for Optimal Implementation, and Effective Test Types

Strategy	Common pitfalls	Tips for optimal implementation
Rereading	× Mistaking the fluency associated with a second reading as having learned the material successfully.	✓ Space out the readings. ✓ Test yourself in between the readings.
Marking (Highlighting, underlining)	× Marking too little; marking noncritical information. × Mindless marking (frequent users need to be careful).	✓ Read through the text first before marking. ✓ Pay attention to the text structure when identifying important information to mark.
Taking notes	× Copying lecture notes verbatim and not reviewing them.	✓ Make sure to review the notes before an exam.
Outlining	× Outline from scratch without paying attention to the text structure.	✓ Identify the main points after reading through the whole section. ✓ Pay attention to the text structure. ✓ Use skeletal outline as a guide.
Flash cards	× Dropping flash cards from study after one successful retrieval.	✓ Retrieve an item correctly at least three times before dropping it from study.

Miyatsu, Toshiya, Khuyen Nguyen, and Mark A. McDaniel. 'Five Popular Study Strategies: Their Pitfalls and Optimal Implementations'. *Perspectives on Psychological Science* 13, no. 3 (1 May 2018): 390–407.

Two parts of effective learning

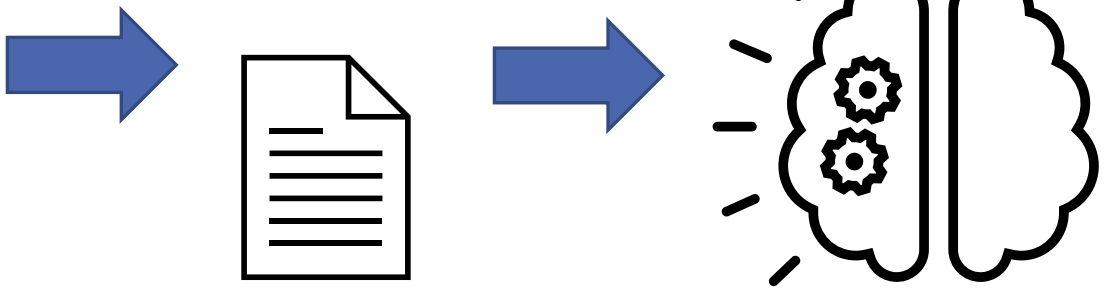
reading

listening

looking

1.Encoding

Taking notes

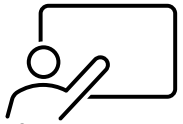


Meta analysis Effect size on learning d= 0.22 = SMALL

Miyatsu, Toshiya, Khuyen Nguyen, and Mark A. McDaniel. 'Five Popular Study Strategies: Their Pitfalls and Optimal Implementations'. *Perspectives on Psychological Science* 13, no. 3 (1 May 2018): 390–407.

Two parts of effective learning

reading

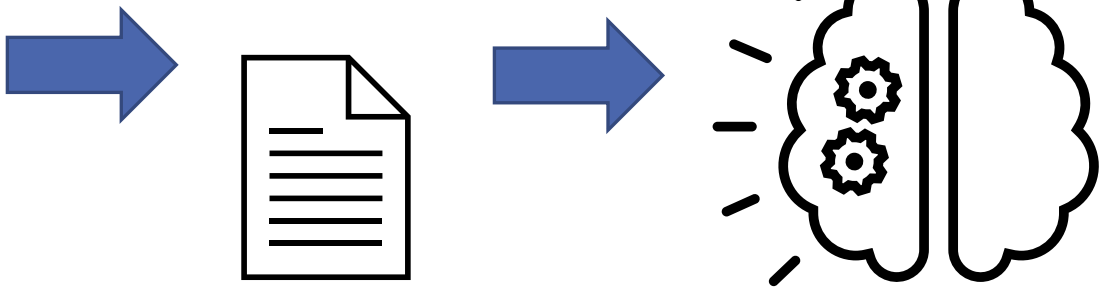


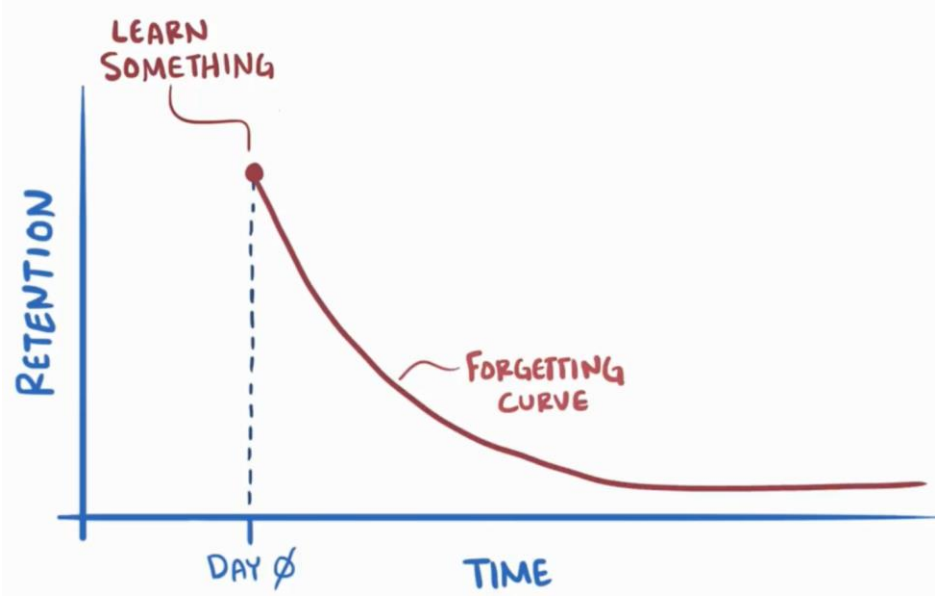
listening

looking

1.Encoding

Taking notes



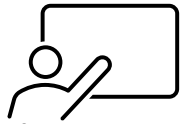


Meta analysis Effect size on learning d= 0.22 = SMALL

https://www.osmosis.org/learn/Spaced_repetition

Two parts of effective learning

reading

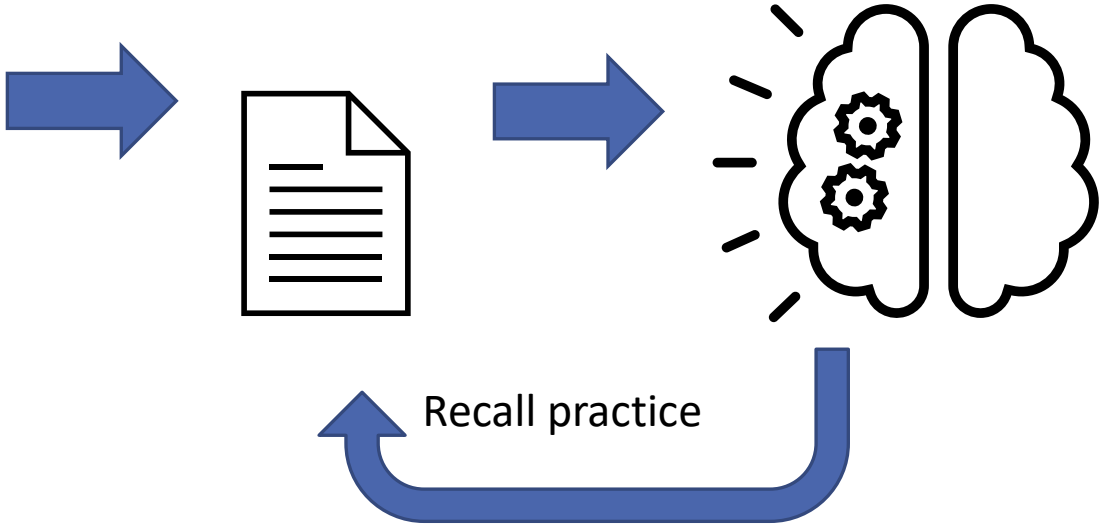


listening

looking

1.Encoding

Taking notes

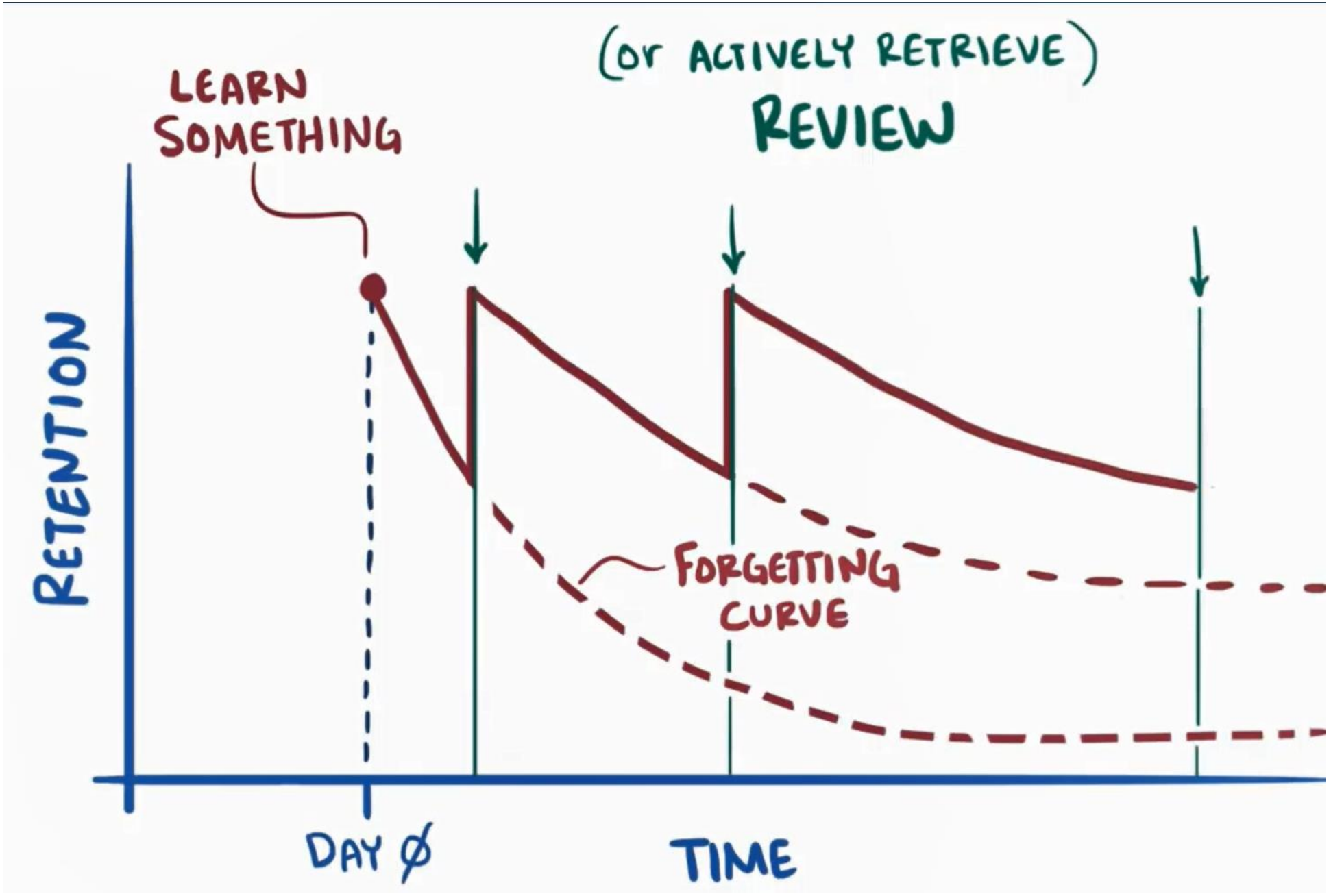


Recall practice

2.Storage ->
long term memory

Meta analysis Effect size
on learning d= 0.75 = LARGE

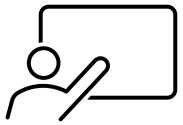
Miyatsu, Toshiya, Khuyen Nguyen, and Mark A. McDaniel. 'Five Popular Study Strategies: Their Pitfalls and Optimal Implementations'. *Perspectives on Psychological Science* 13, no. 3 (1 May 2018): 390–407.



https://www.osmosis.org/learn/Spaced_repetition

Two parts of effective learning

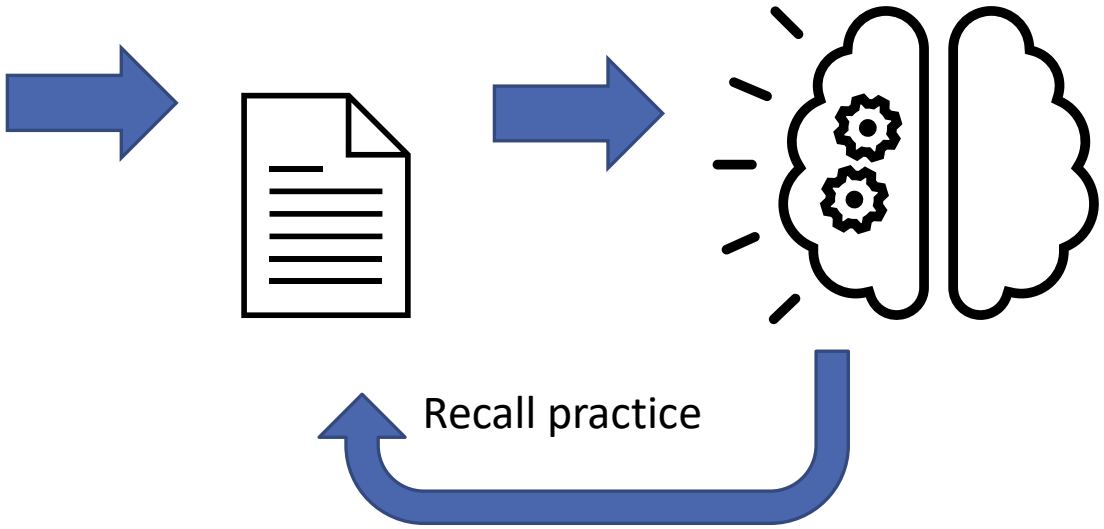
reading



listening

1.Encoding

Taking notes



Recall practice

2.Storage
long term memory

Meta analysis Effect size on learning
d= 0.22 = SMALL

Meta analysis Effect size on learning d= 0.75 = LARGE

Capture : How take to notes for effective retrieval

SQ3R

HOW TO BE AN EFFECTIVE READER!

READ

Read the whole text quickly.
Don't stop. Even if there is something difficult that you don't understand.

RECALL

Look back at your query questions.

Can you identify which sections help you?

SURVEY

Scan the text and identify its structure.

Do you need to read this text?

QUERY

Ask yourself about each section.

What do you expect to discover?

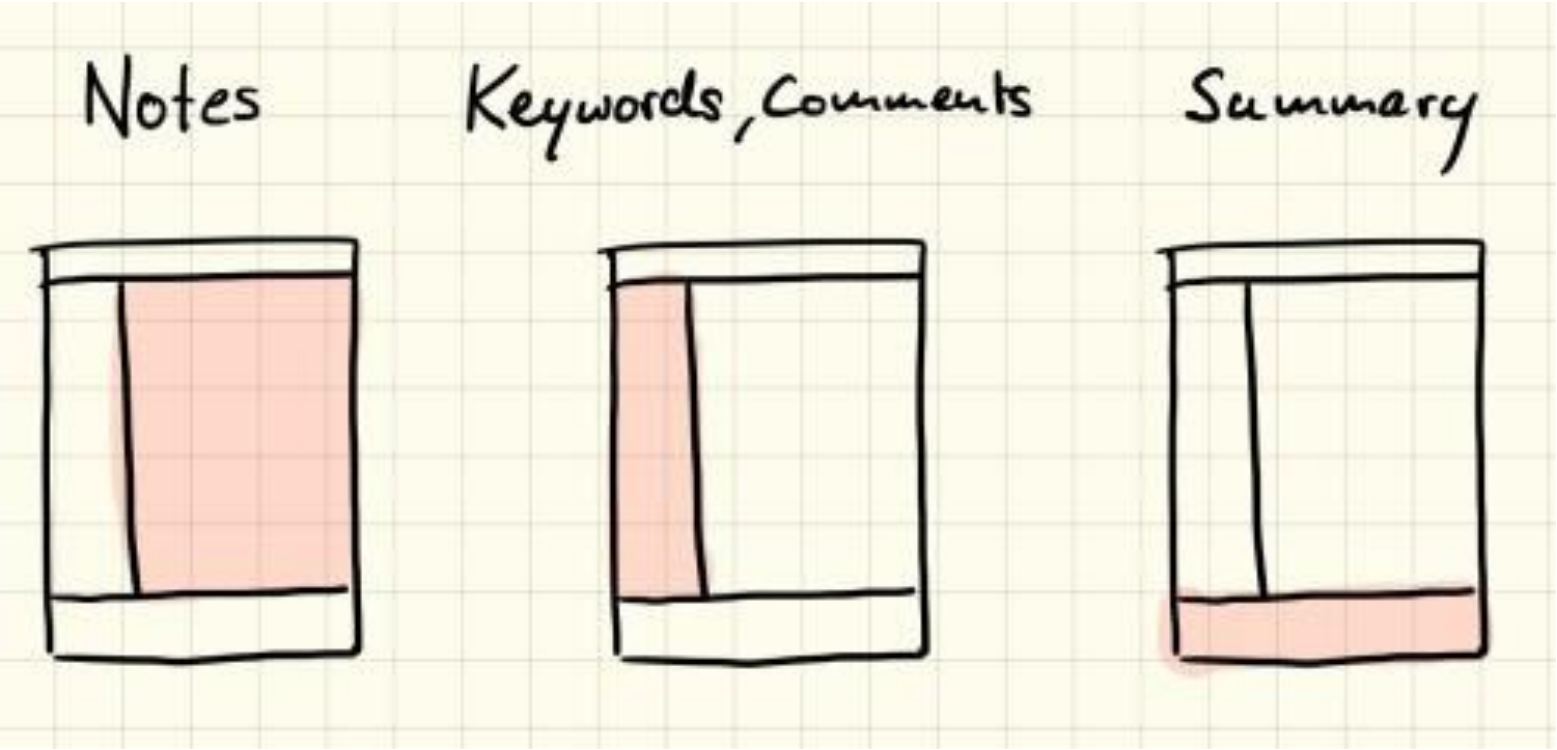
REVIEW

Read important sections again slowly.
Remember why you are reading.

Take notes so that you can remember helpful information and where you found it.

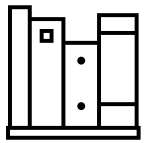
https://miuc.org/sq3r-study-method/
http://lsc.cornell.edu/wp-content/uploads/2015/10/Textbook-Reading-Systems.pdf

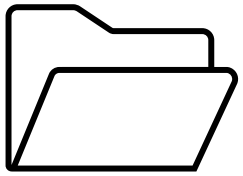
Cornell notes

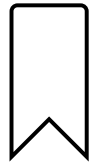


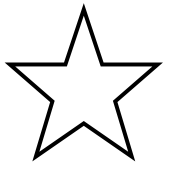
https://medium.goodnotes.com/study-with-ease-the-best-way-to-take-notes-2749a3e8297b

How can you organise information for retrieval?





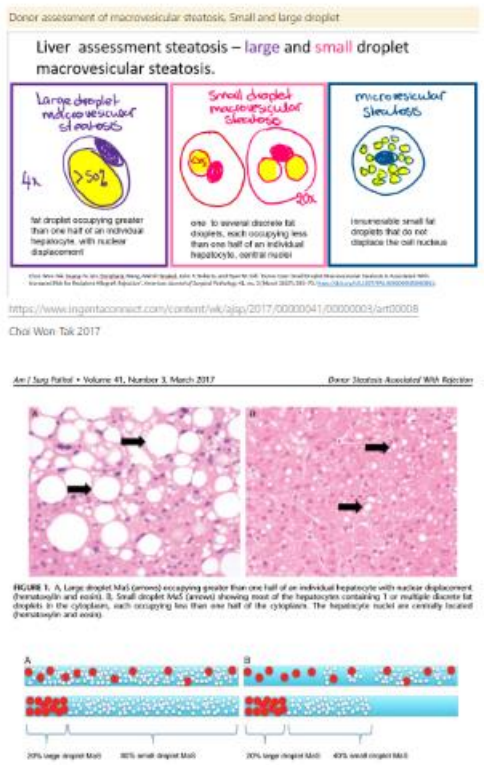


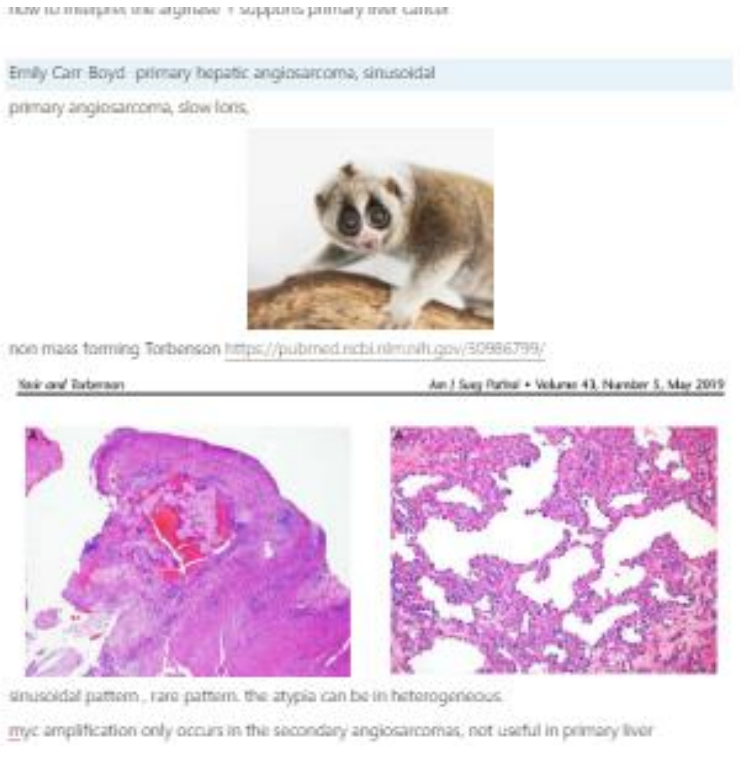


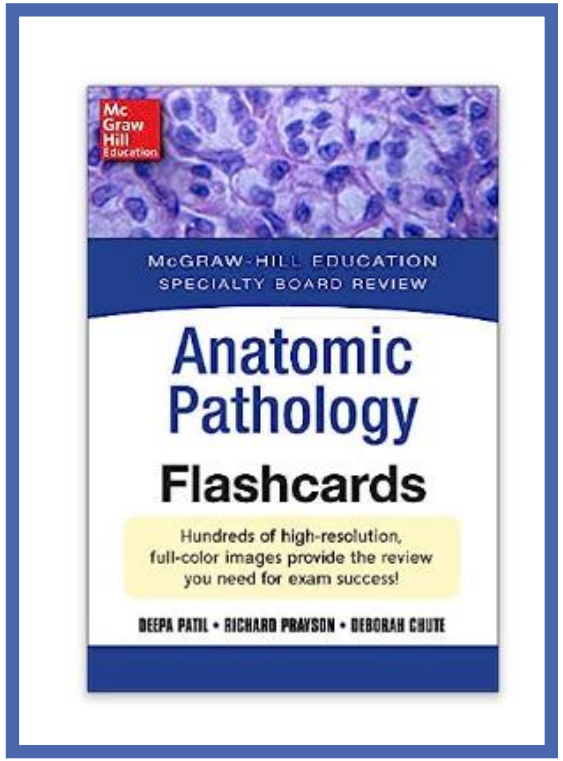
My digital PKM

Conference notes example

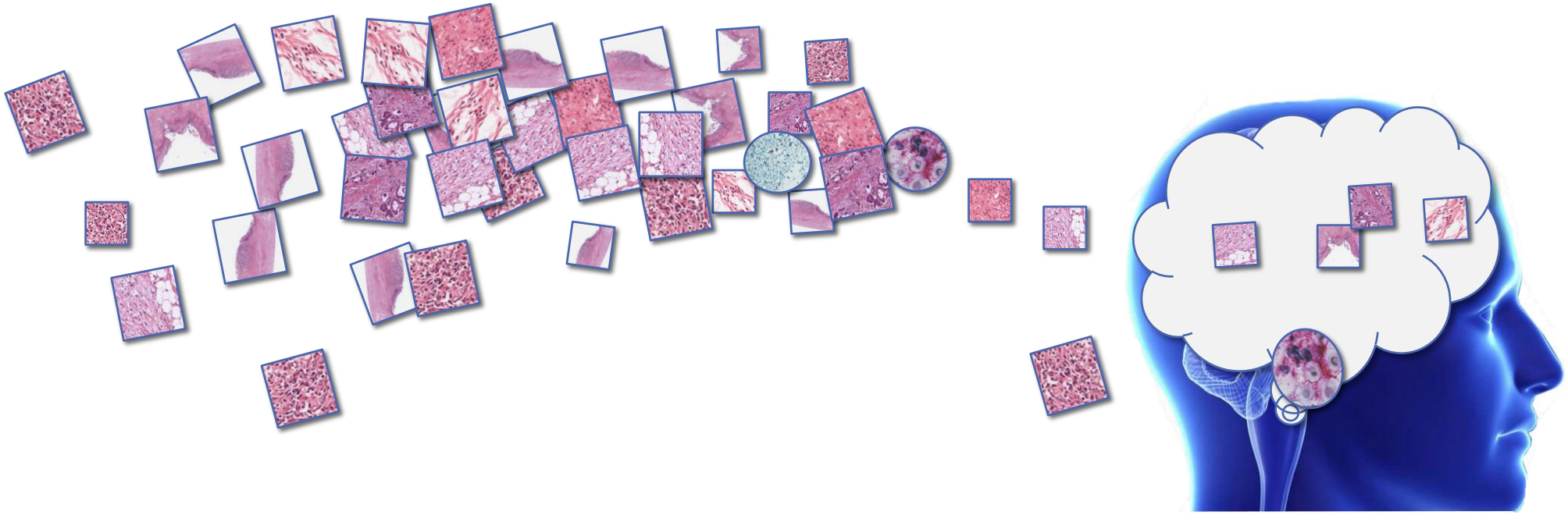
Brisbane IAP 2023 Liver companion club.



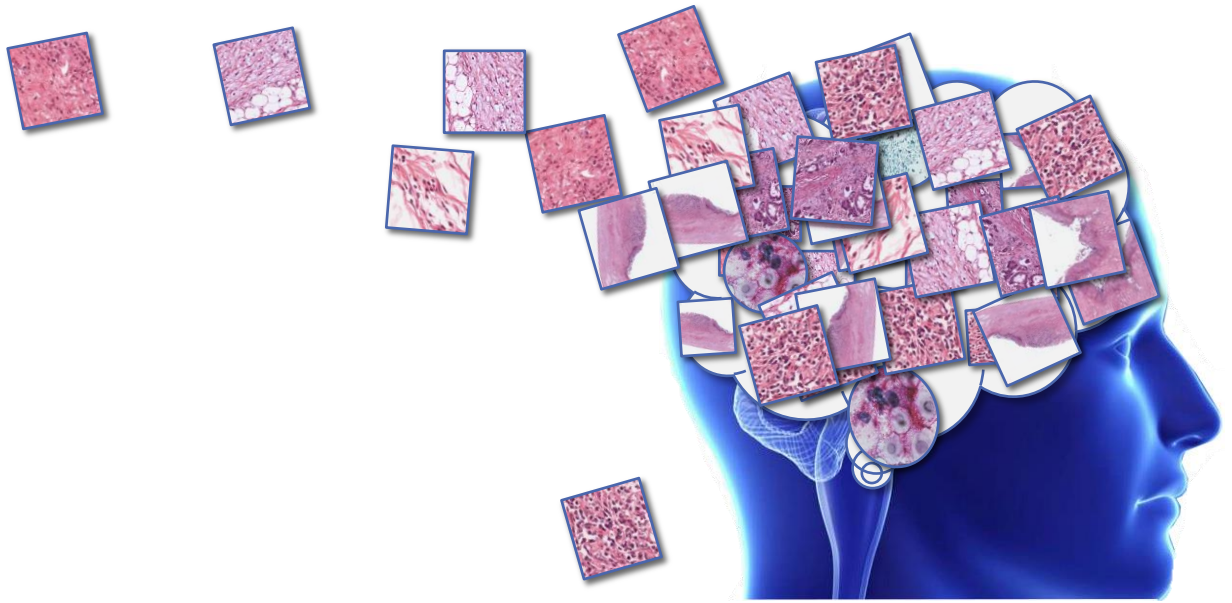




Are Flashcards useful?

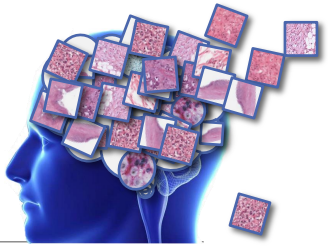


Learning from slide sets



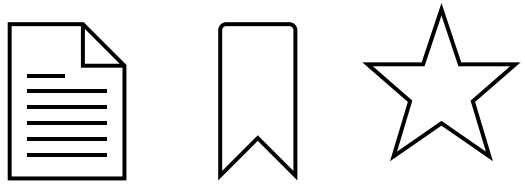
Learning from slide sets

How do you manage learning from slides?

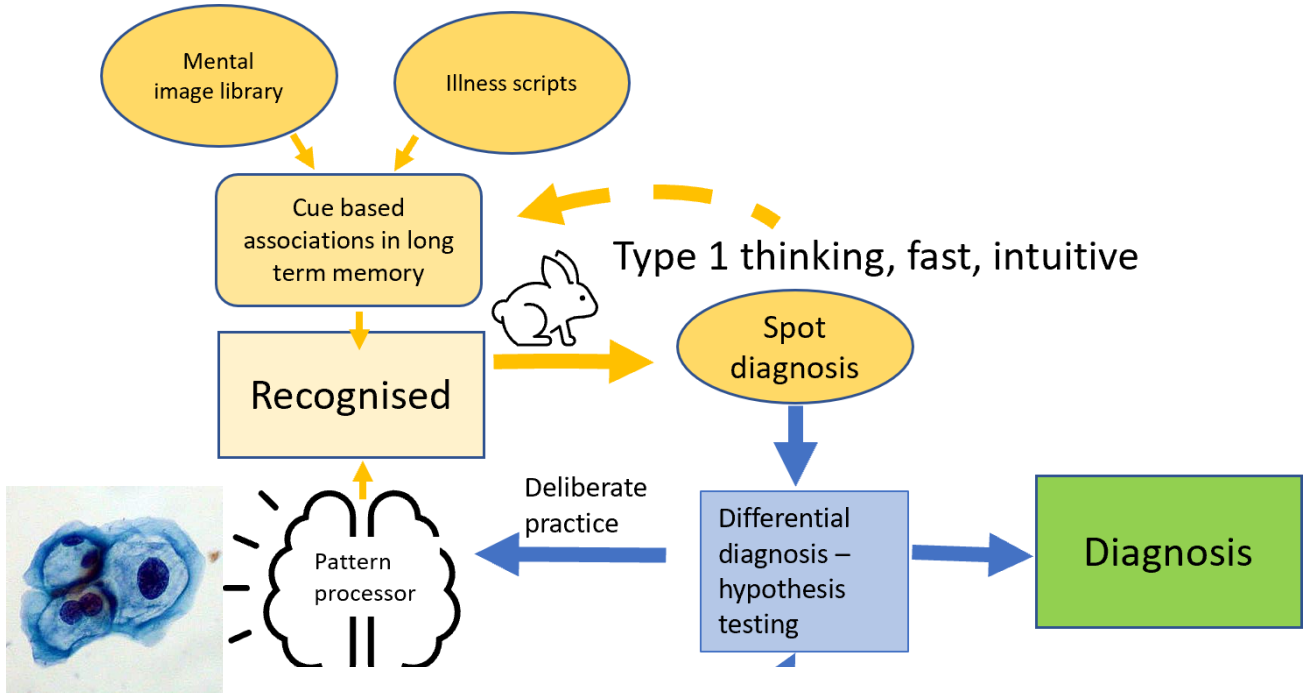


Glass

Digital



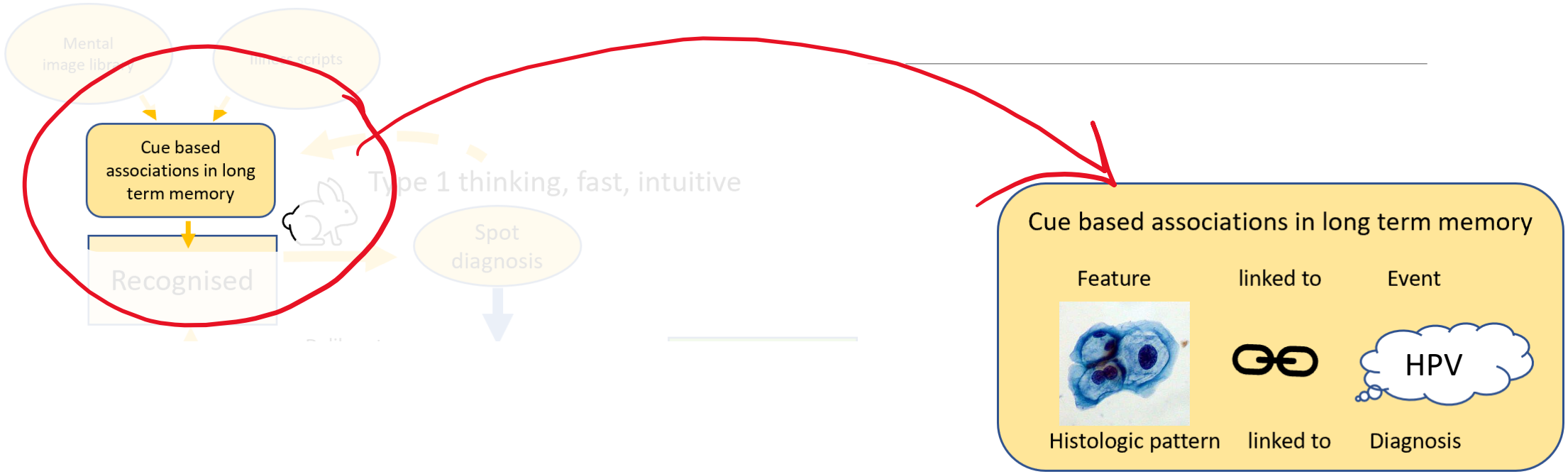
How does our brain make diagnoses?



Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

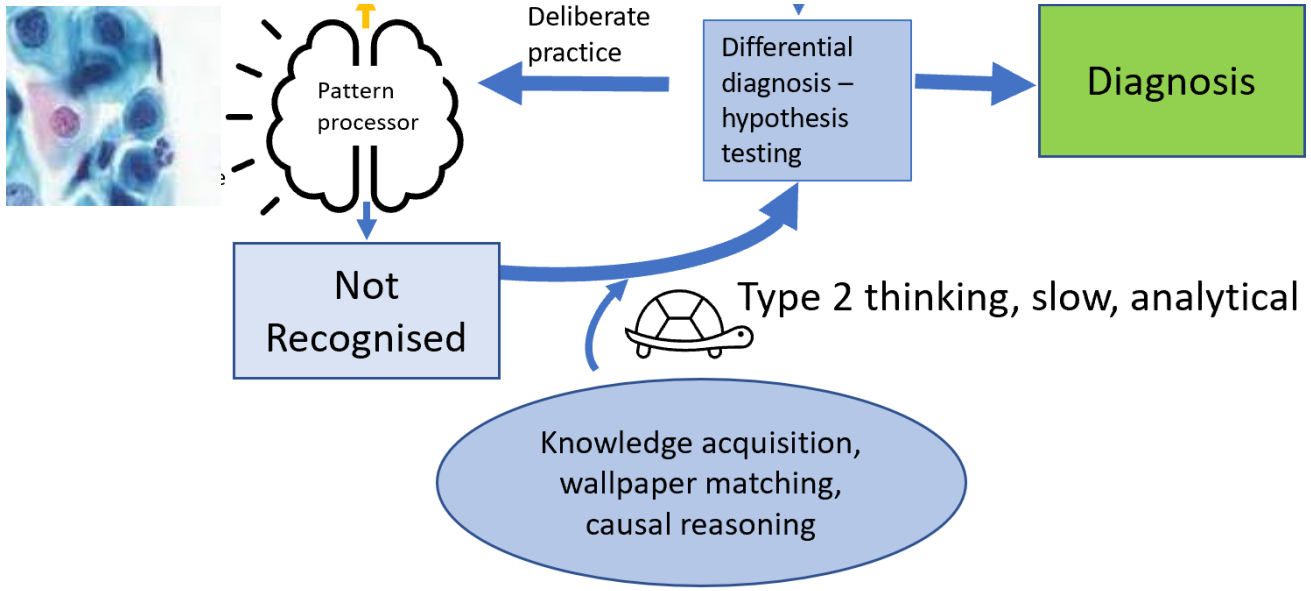
How does our brain make diagnoses?



Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

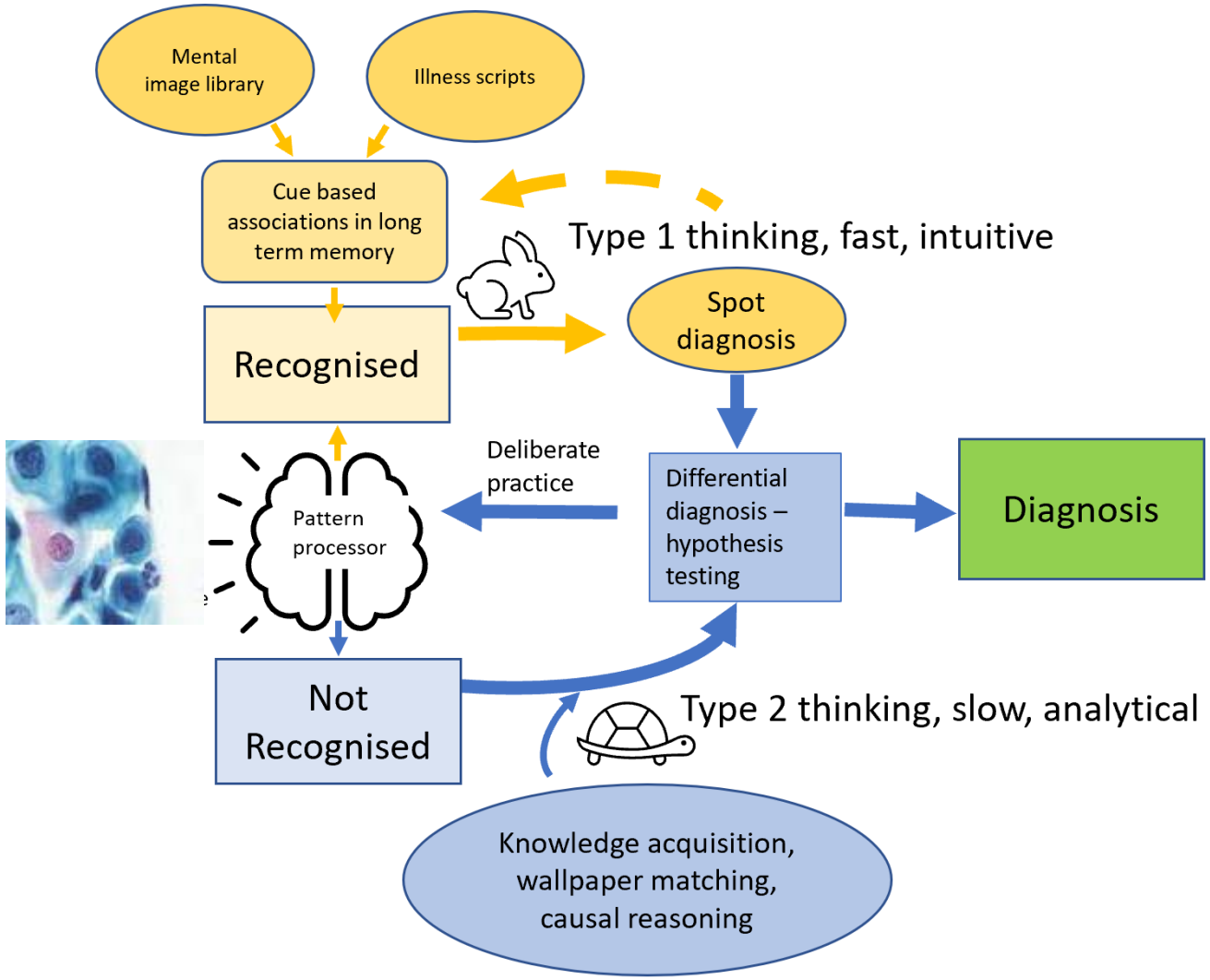
How does our brain make diagnoses?



Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

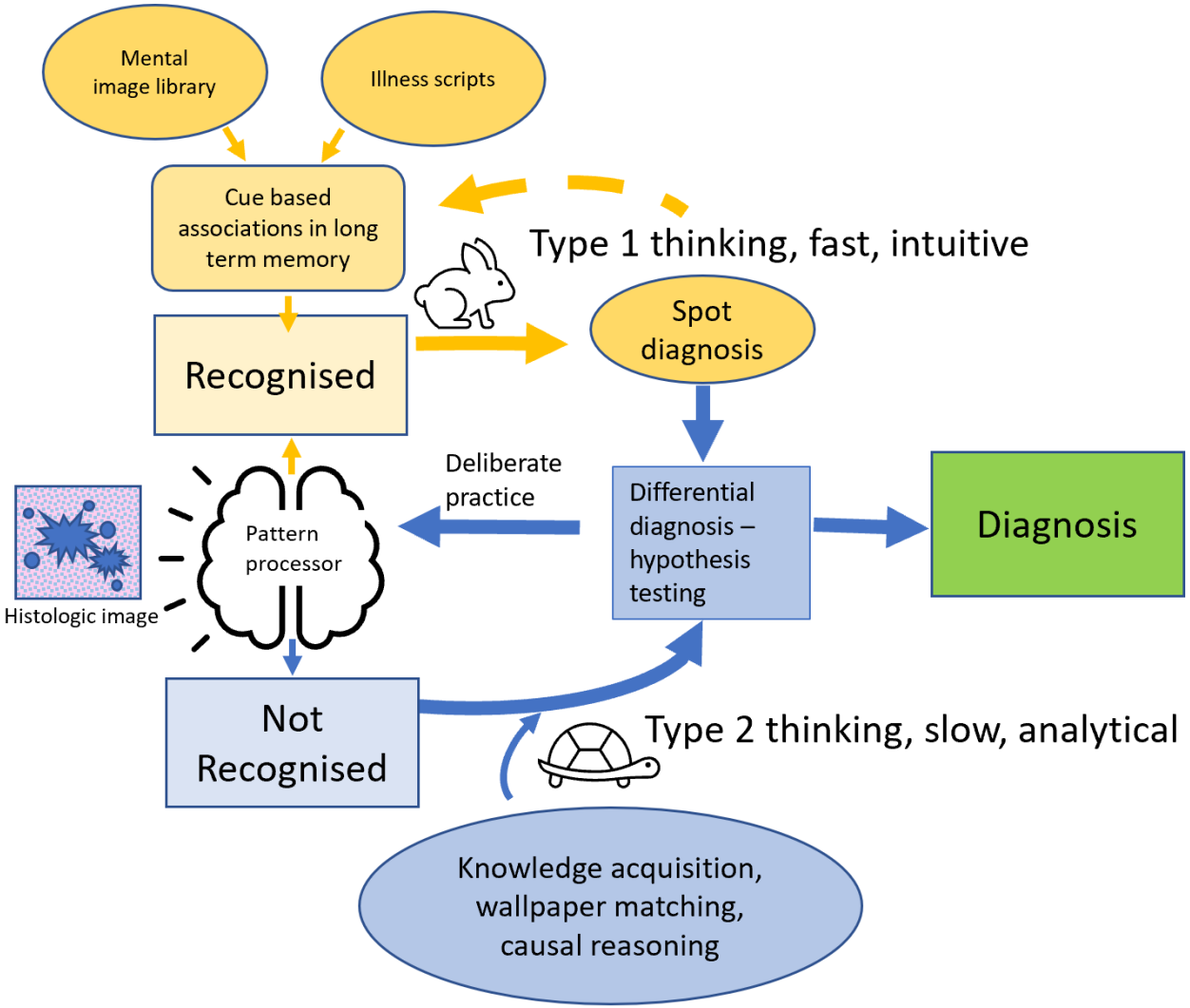
How does our brain make diagnoses?



Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

How does our brain make diagnoses?



Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

Image keys and pattern recognition

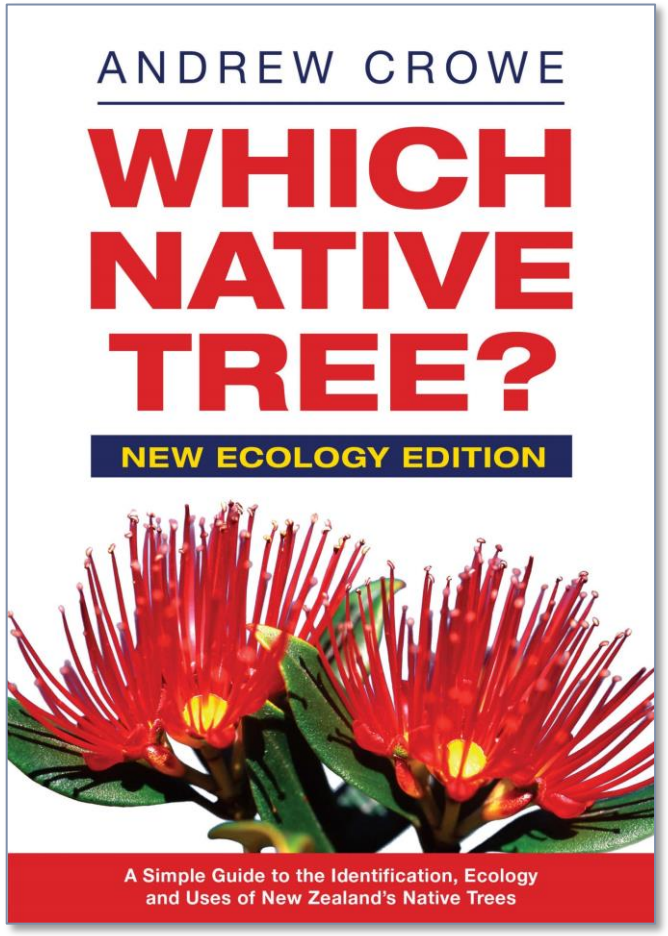
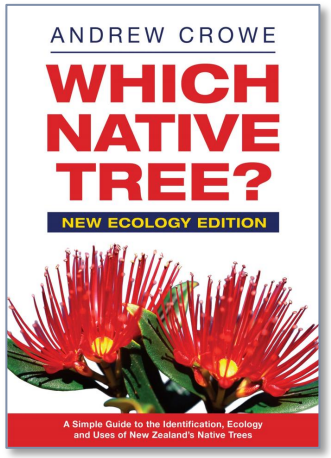
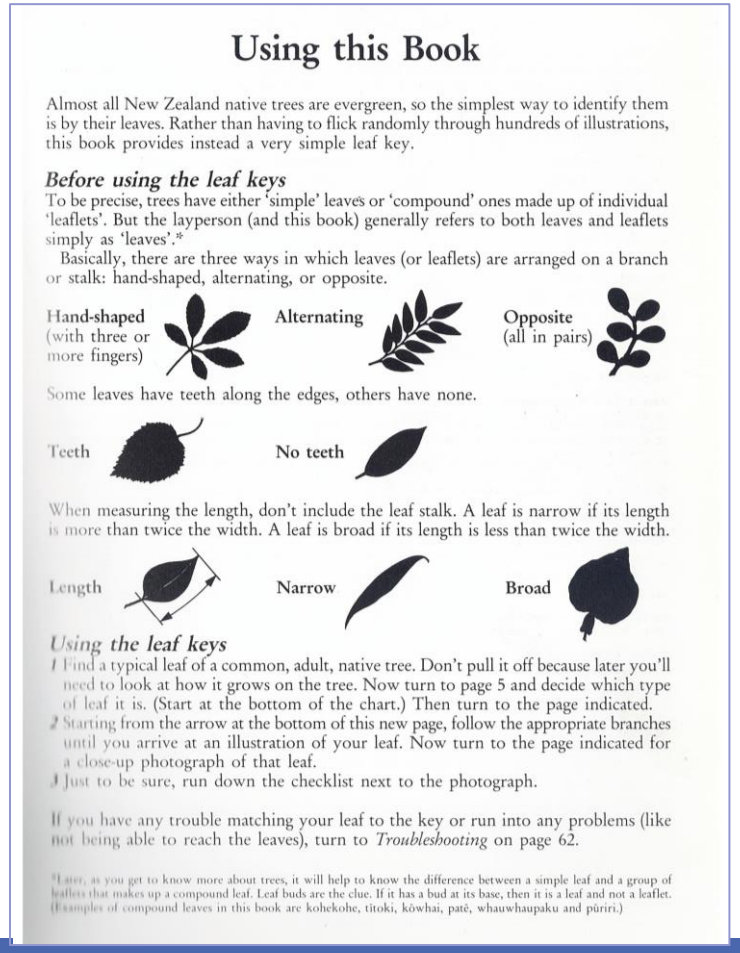


Image keys and pattern recognition





Using this Book

Almost all New Zealand native trees are evergreen, so the simplest way to identify them is by their leaves. Rather than having to flick randomly through hundreds of illustrations, this book provides instead a very simple leaf key.

Before using the leaf keys

To be precise, trees have either 'simple' leaves or 'compound' ones made up of individual 'leaflets'. But the layperson (and this book) generally refers to both leaves and leaflets simply as 'leaves'.*

Basically, there are three ways in which leaves (or leaflets) are arranged on a branch or stalk: hand-shaped, alternating, or opposite.

Hand-shaped (with three or more fingers) Alternating Opposite (all in pairs)

Some leaves have teeth along the edges, others have none.

Teeth No teeth

When measuring the length, don't include the leaf stalk. A leaf is narrow if its length is more than twice the width. A leaf is broad if its length is less than twice the width.

Length Narrow Broad

Using the leaf keys

1 Find a typical leaf of a common, adult, native tree. Don't pull it off because later you'll need to look at how it grows on the tree. Now turn to page 5 and decide which type of leaf it is. (Start at the bottom of the chart.) Then turn to the page indicated.

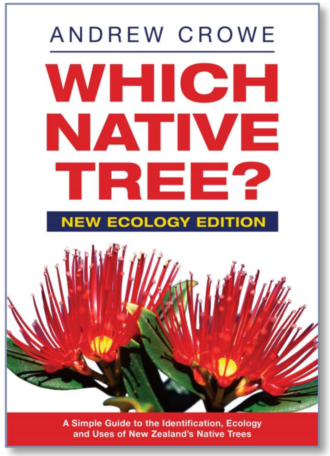
2 Starting from the arrow at the bottom of this new page, follow the appropriate branches until you arrive at an illustration of your leaf. Now turn to the page indicated for a close-up photograph of that leaf.

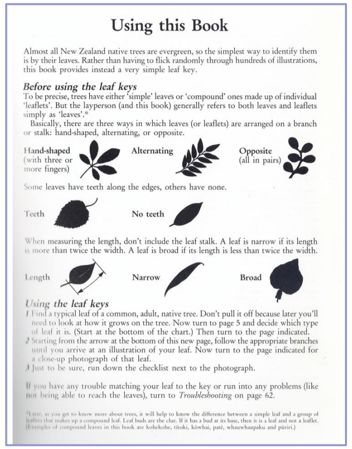
3 Just to be sure, run down the checklist next to the photograph.

If you have any trouble matching your leaf to the key or run into any problems (like not being able to reach the leaves), turn to *Troubleshooting* on page 62.

*Later, as you get to know more about trees, it will help to know the difference between a simple leaf and a group of leaflets that makes up a compound leaf. Leaf buds are the clue. If it has a bud at its base, then it is a leaf and not a leaflet. (Examples of compound leaves in this book are kohekohe, tītoki, kōwhai, patē, whauwhaupaku and pūriri.)

Image keys and pattern recognition





Using this Book

Almost all New Zealand native trees are evergreen, so the simplest way to identify them is by their leaves. Rather than having to flick randomly through hundreds of illustrations, this book provides instead a very simple leaf key.

Before using the leaf keys

To be precise, trees have either 'simple' leaves or 'compound' ones made up of individual 'leaflets'. But the layperson (and this book) generally refers to both leaves and leaflets simply as 'leaves'.*

Basically, there are three ways in which leaves (or leaflets) are arranged on a branch or stalk: hand-shaped, alternating, or opposite.

Hand-shaped (with three or more fingers) **Alternating** **Opposite** (all in pairs)

Some leaves have teeth along the edges, others have none.

Teeth **No teeth**

When measuring the length, don't include the leaf stalk. A leaf is narrow if its length is more than twice the width. A leaf is broad if its length is less than twice the width.

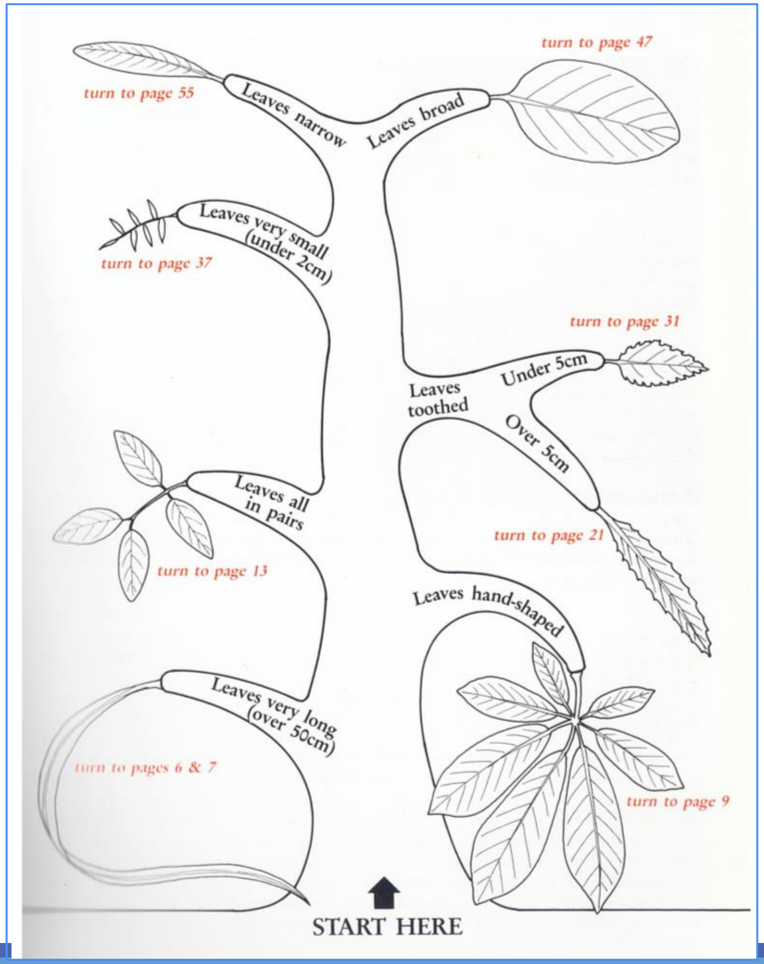
Length **Narrow** **Broad**

Using the leaf keys

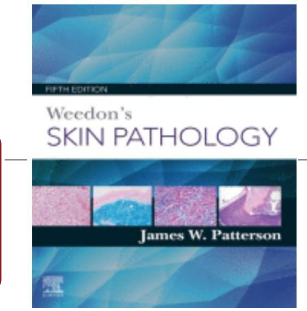
1 Find a typical leaf of a common, adult, native tree. Don't pull it off because later you'll need to look at how it grows on the tree. Now turn to page 5 and decide which type of leaf it is. (Start at the bottom of the chart.) Then turn to the page indicated.
2 Starting from the arrow at the bottom of this new page, follow the appropriate branches until you arrive at an illustration of your leaf. Now turn to the page indicated for a close-up photograph of that leaf.
3 Just to be sure, run down the checklist next to the photograph.

If you have any trouble matching your leaf to the key or run into any problems (like not being able to reach the leaves), turn to *Troubleshooting* on page 62.

*Later, as you get to know more about trees, it will help to know the difference between a simple leaf and a group of leaflets that makes up a compound leaf. Leaf buds are the clue. If it has a bud at its base, then it is a leaf and not a leaflet. (Examples of compound leaves in this book are kohekohe, tītoki, kōwhai, patē, whauwhaupaku and pūriri.)



Pattern recognition – inflammatory skin

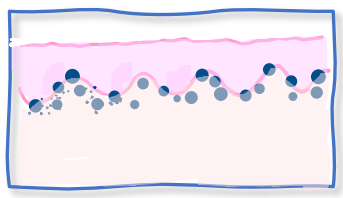


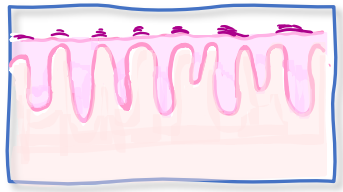
Inflammatory Skin

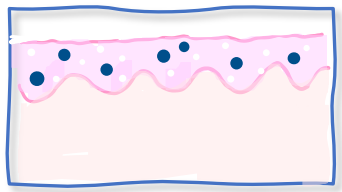
- Major
- Minor

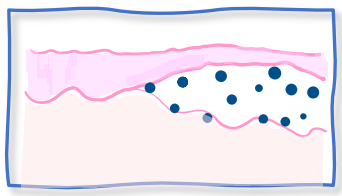
Major:

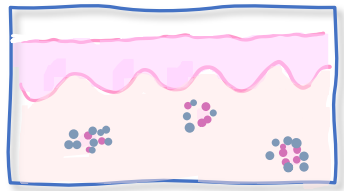
- Lichenoid
- Psoriasiform
- Spongiotic
- Vesicobullous
- Granulomatous
- Vasculopathic

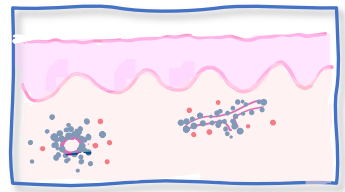






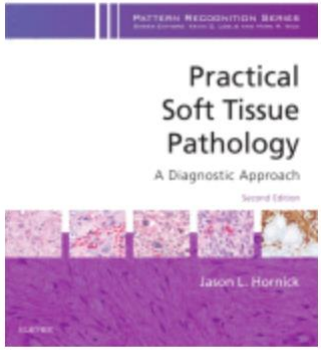




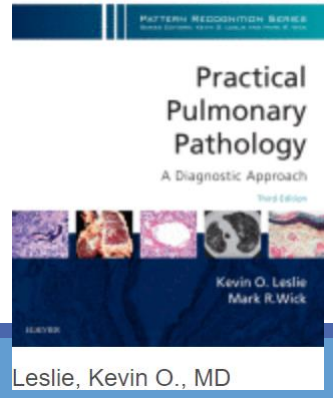


Pattern recognition - Book series – Clinical key

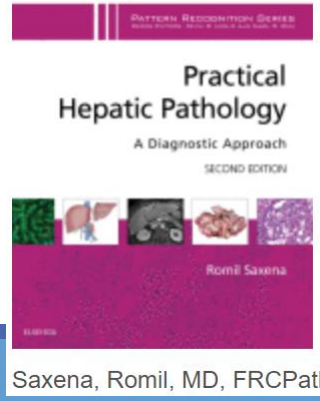
Pattern Recognition Series
Series editors:
Kevin O. Leslie and Mark R. Wick
Practical Breast Pathology
Kristen A. Atkins and Christina S. Kong
Practical Cytopathology
Andrew S. Field and Matthew A. Zarka
Practical Hepatic Pathology, 2 nd Edition
Romil Saxena
Practical Orthopedic Pathology
Andrea T. Deyrup and Gene P. Siegal
Practical Pulmonary Pathology, 2 nd Edition
Kevin O. Leslie and Mark R. Wick
Practical Renal Pathology
Donna J. Lager and Neil A. Abrahams
Practical Skin Pathology
James W. Patterson
Practical Soft Tissue Pathology
Jason L. Hornick
Practical Surgical Neuropathology
Arie Perry and Daniel J. Brat



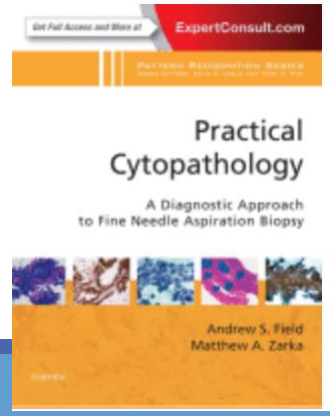
Hornick, Jason L., MD, PhD



Leslie, Kevin O., MD



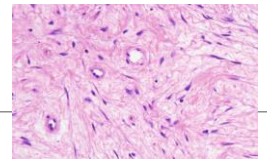
Saxena, Romil, MD, FRCPath



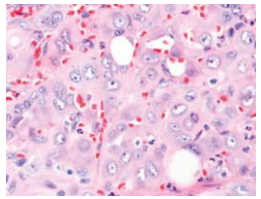
Pattern recognition – soft tissue

Hornick, Jason L., MD, PhD

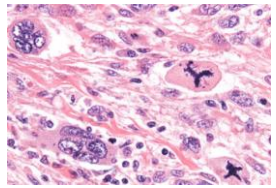
Spindle cell



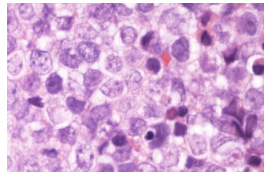
Epithelioid



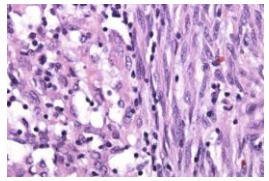
Pleomorphic



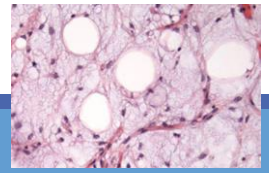
Round cell



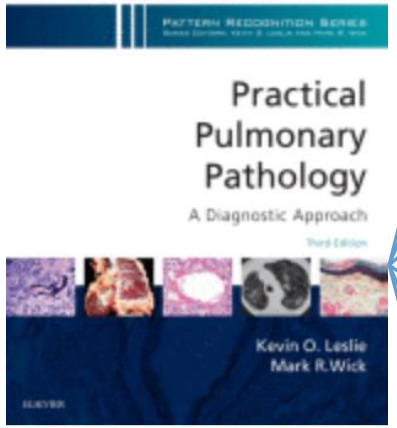
Biphasic/mixed



Myxoid

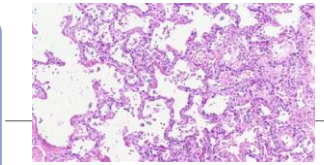


Pattern recognition - lung

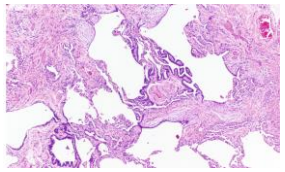


Leslie, Kevin O., MD

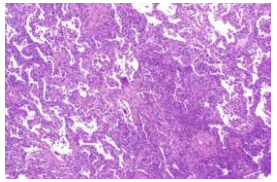
Acute lung injury



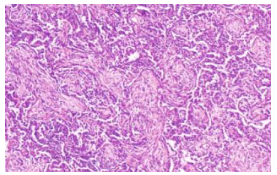
fibrosis



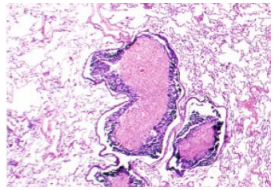
Cellular infiltrates



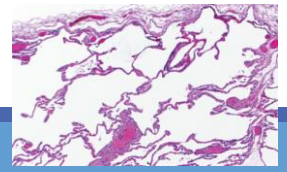
Alveolar filling



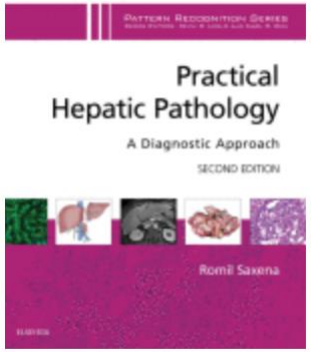
nodules



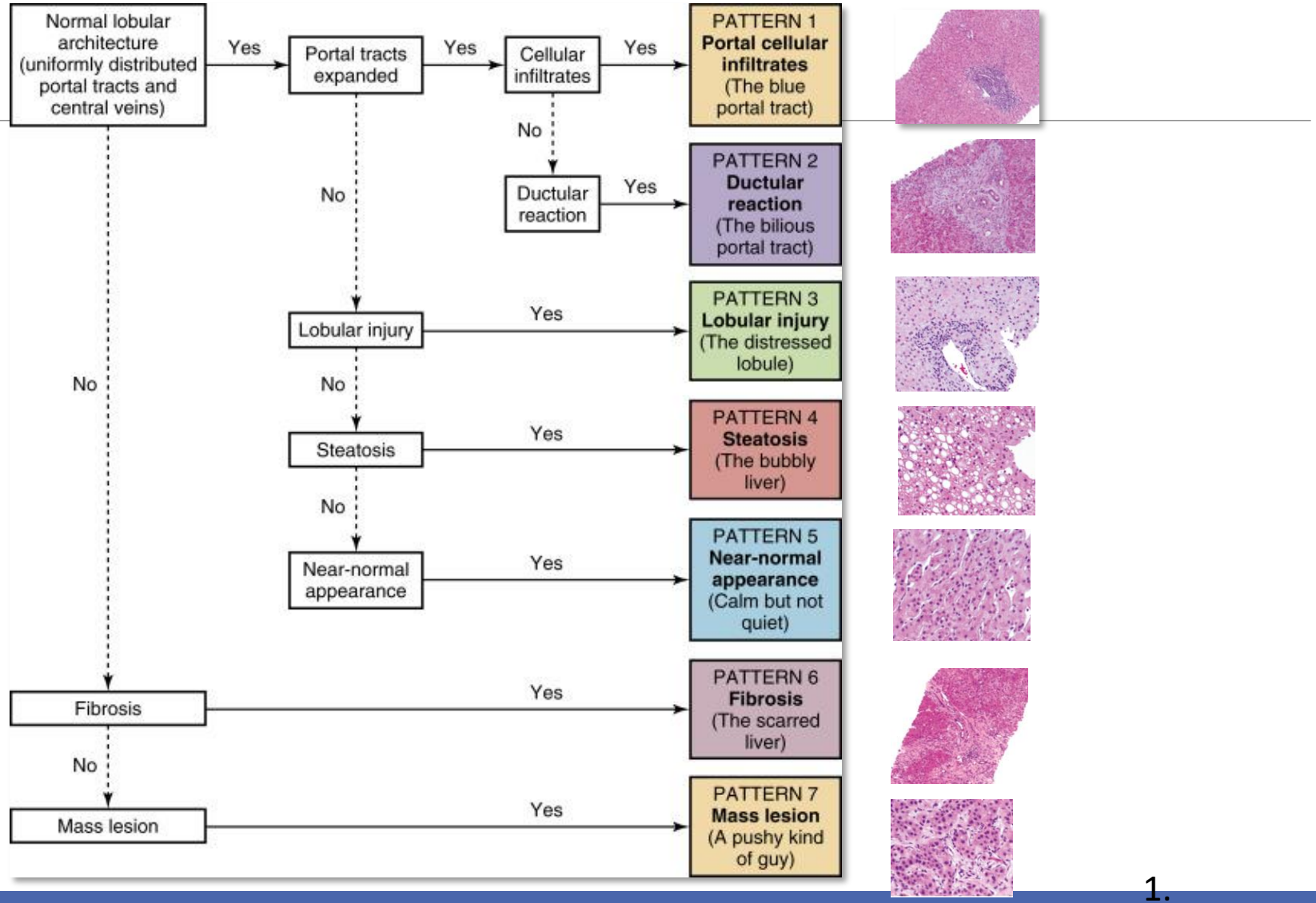
Near normal



Pattern recognition - liver

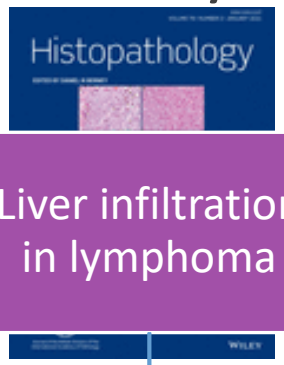


Saxena, Romil, MD, FRCPath



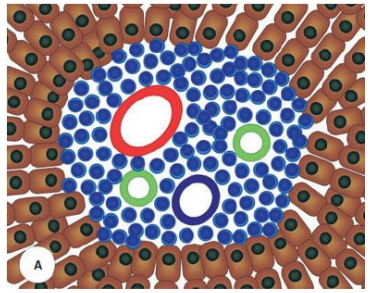
1. Saxena R. Practical Hepatic Pathology: A Diagnostic Approach E-Book: A Volume in the Pattern Recognition Series. Elsevier Health Sciences; 2018. 795 p.

Pattern recognition – liver lymphoma



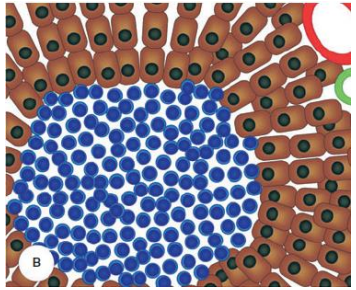
Liver infiltration in lymphoma

Portal



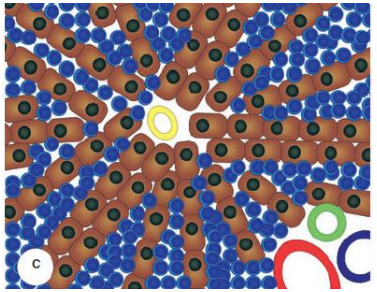
CLL
Hodgkin

Nodular



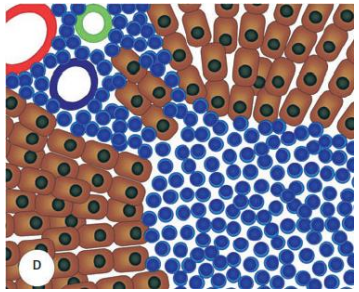
DLBCL
Burkitt
PTLD

Sinusoidal



TCL
Reactive T cells
MZL

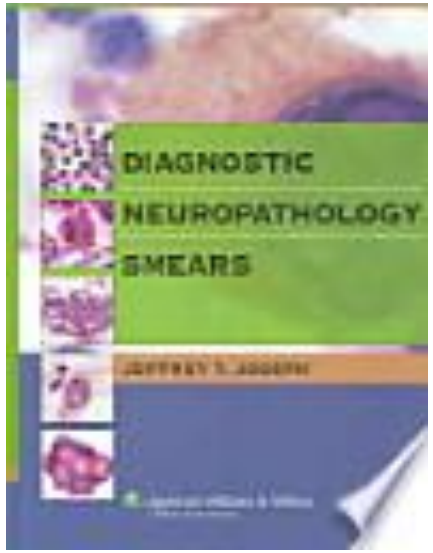
mixed



TCL
CLL
DLBCL
MZL

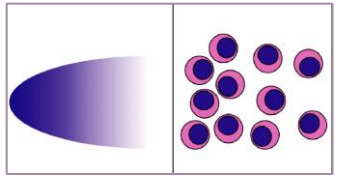
Baumhoer, D., A. Tzankov, S. Dirnhofer, L. Tornillo, and L. M. Terracciano. 'Patterns of Liver Infiltration in Lymphoproliferative Disease'. *Histopathology* 53, no. 1 (2008): 81–90.

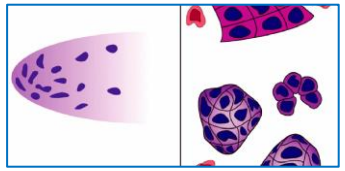
Pattern recognition – brain smears

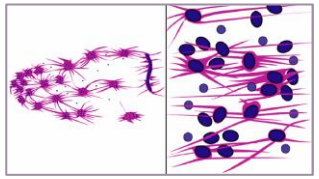


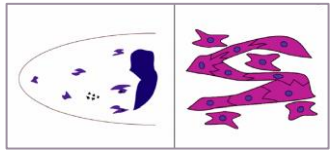
Brain smear

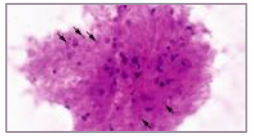
- Normal
- Non cohesive
- epithelial
- glial
- Cohesive
- necrotic





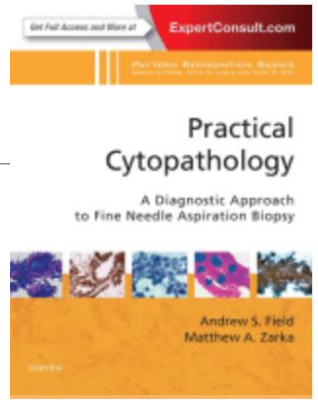






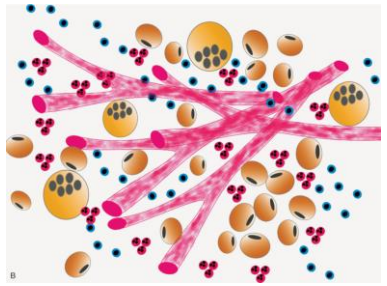
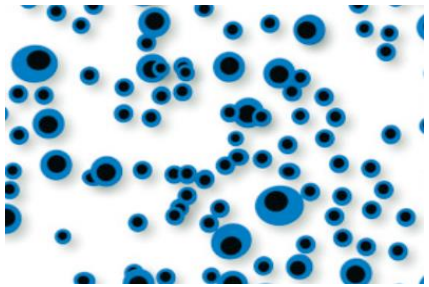
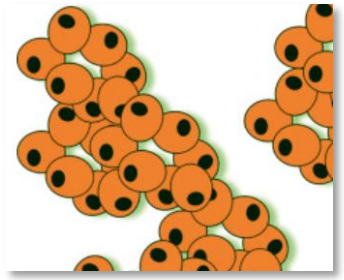
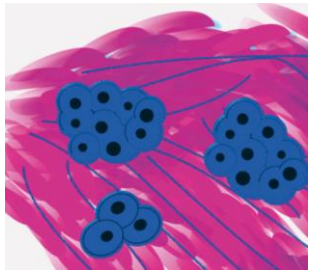
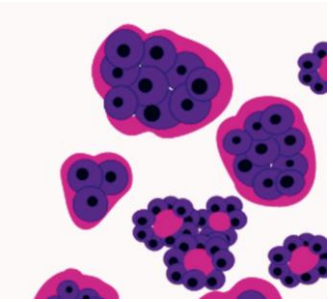
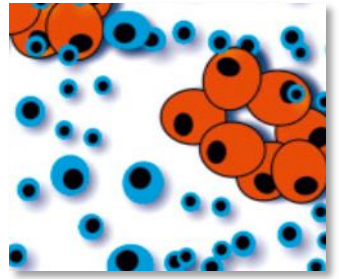
Joseph J. Diagnostic Neuropathology Smears 1st ed. Lippincott Williams & Wilkins; 2006

Pattern recognition - FNA



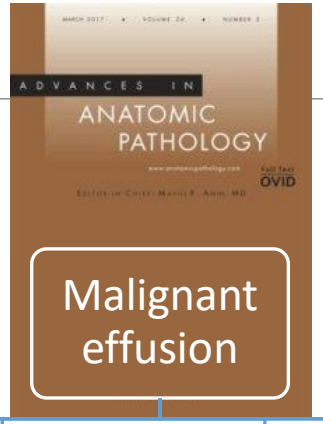
Salivary FNA

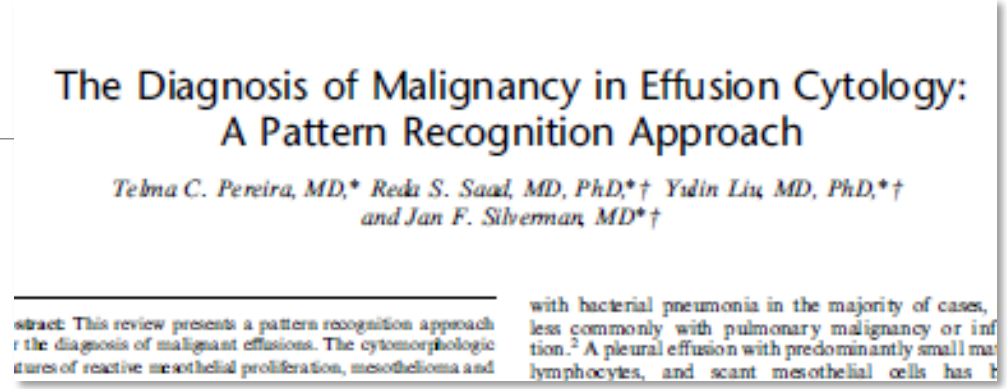
- Mixed inflammatory
- Lymphocyte only
- Epithelial without myoepithelial
- Epithelial neopl with myoepithelial stroma
- Epithelial neoplasm with scant stroma
- Epithelial and neoplasms with lymphoid

Illustrations from book

Pattern recognition – malignant effusions



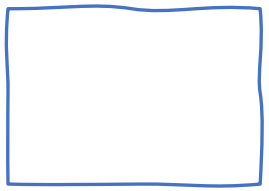


The Diagnosis of Malignancy in Effusion Cytology: A Pattern Recognition Approach

Telma C. Pereira, MD, Reda S. Saad, MD, PhD,*† Yulin Liu, MD, PhD,*† and Jan F. Silverman, MD*†*

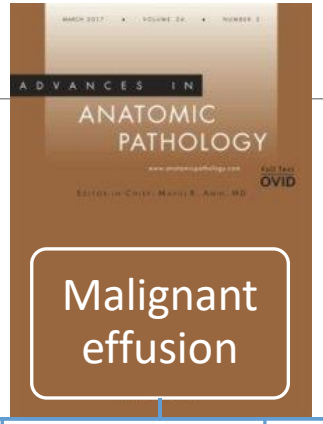
Malignant effusion

- Papillary groups
- Psammoma bodies
- Cannon balls
- Acinar groups
- Single cell
- Linear single files
- Signet ring vacuoles
- Multi-nucleation



Pereira, Telma C., Reda S. Saad, Yulin Liu, and Jan F. Silverman. 'The Diagnosis of Malignancy in Effusion Cytology: A Pattern Recognition Approach'. *Advances in Anatomic Pathology* 13, no. 4 (July 2006): 174–84.

Pattern recognition – malignant effusions



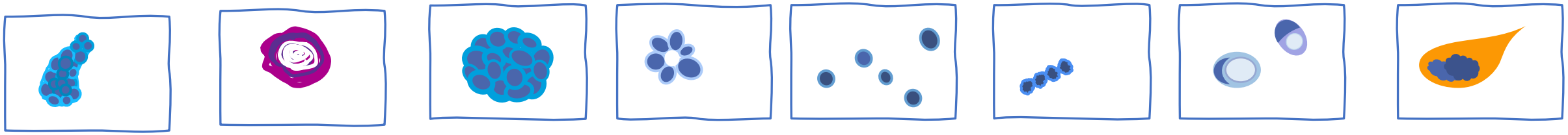
The Diagnosis of Malignancy in Effusion Cytology: A Pattern Recognition Approach

Telma C. Pereira, MD, Reda S. Saad, MD, PhD,*† Yulin Liu, MD, PhD,*† and Jan F. Silverman, MD*†*

stract: This review presents a pattern recognition approach
the diagnosis of malignant effusions. The cytomorphologic
tures of reactive mesothelial proliferation, mesothelioma and
with bacterial pneumonia in the majority of cases,
less commonly with pulmonary malignancy or inf
tion.[2] A pleural effusion with predominantly small ma
lymphocytes, and scant mesothelial cells has

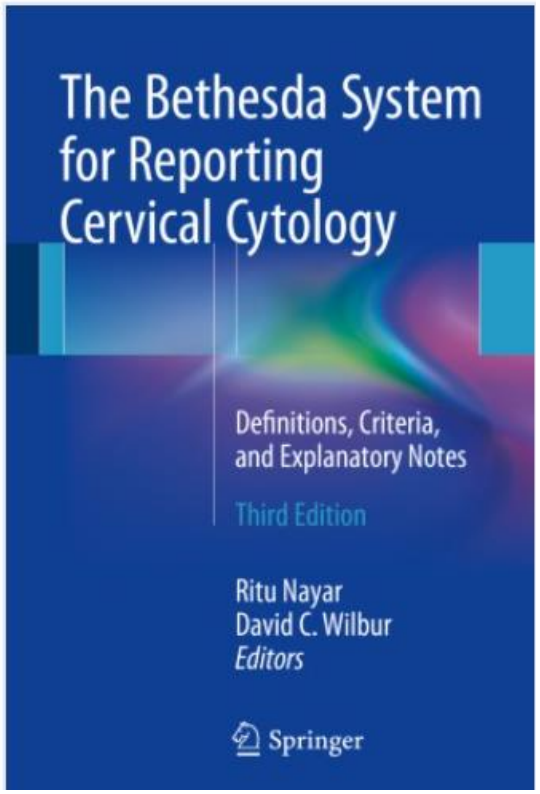
Malignant effusion

- Papillary groups
- Psammoma bodies
- Cannon balls
- Acinar groups
- Single cell
- Linear single files
- Signet ring vacuoles
- Multi-nucleation



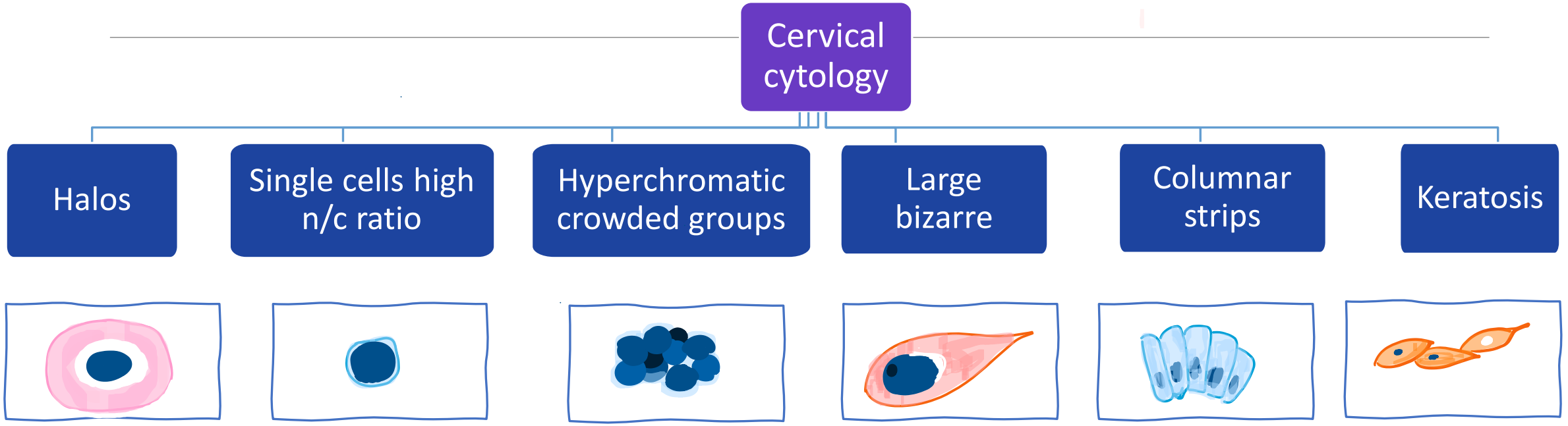
Pereira, Telma C., Reda S. Saad, Yulin Liu, and Jan F. Silverman. 'The Diagnosis of Malignancy in Effusion Cytology: A Pattern Recognition Approach'. *Advances in Anatomic Pathology* 13, no. 4 (July 2006): 174–84.

Classification system – cervical cytology



Bethesda System
Inadequate
Negative
ASCUS - atypical squamous cells of undetermined significance
AGC - atypical glandular cells of undetermined significance
LSIL - low grade squamous intraepithelial lesion
HSIL - high grade squamous intraepithelial lesion
HSIL - high grade squamous intraepithelial lesion
Squamous cell carcinoma
AGC-neoplastic or AIS - adenocarcinoma in situ

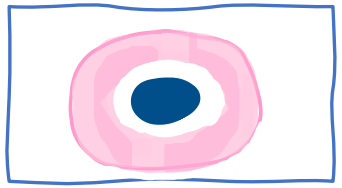
Pattern recognition – cervical cytology



Pattern recognition algorithm for diagnosis

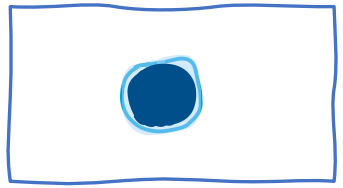
Cervical cytology

Halos



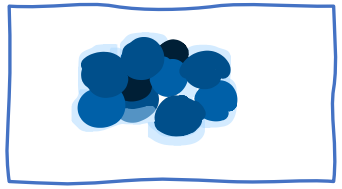
HPV/LSIL
Reactive
Candida
Trichomonas
ASCUS

Single cells high n/c ratio



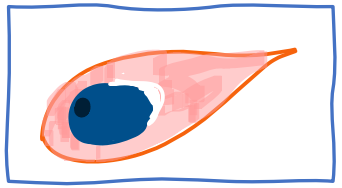
Squamous metaplasia
Reserve cell
Parabasal cell
Atrophic
HSIL
ASC-H
Endometrial
IUD cell

Hyperchromatic crowded groups



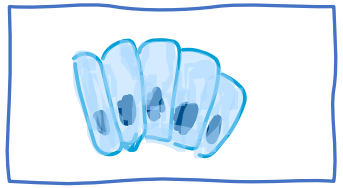
endocervical
Endometrial
HSIL
Lower uterine segment
Atrophy
AGUS
AIS
Adenocarcinoma

Large bizarre



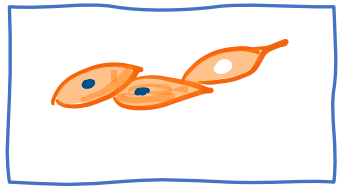
Radiation
Chemotherapy
SCC
Herpes
CMV
HPV/LSIL

Columnar strips



Endocervical
Tubal metaplasia
AIS
AGUS

Keratosis



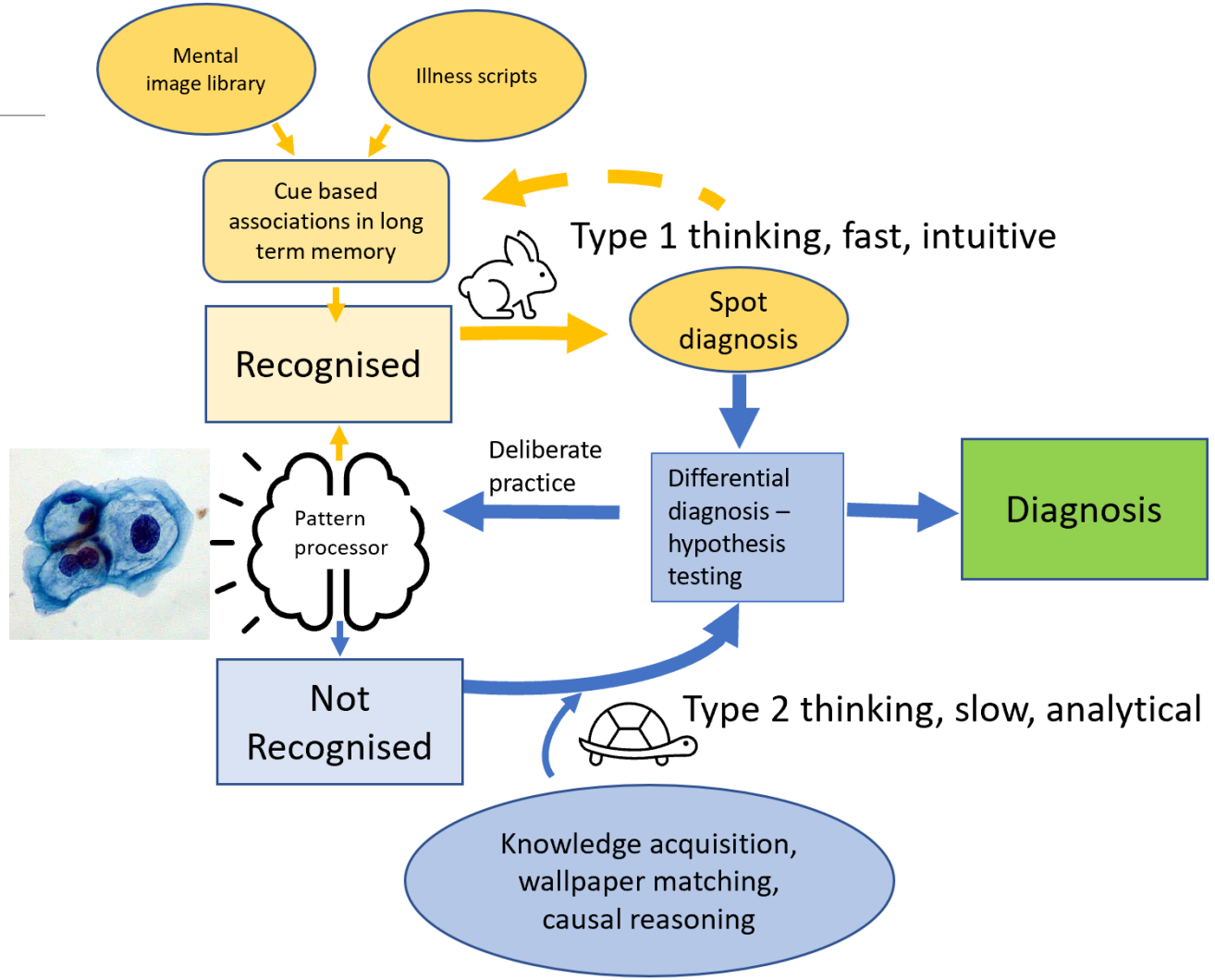
HPV/LSIL
ASCUS
SCC
Reactive
Prolapse

Pattern recognition at work

Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

Pattern recognition at work



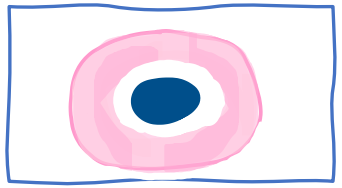
Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

Pattern recognition algorithm for diagnosis

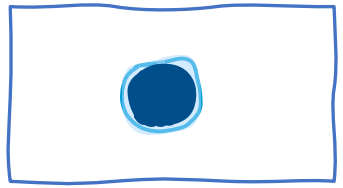
Cervical cytology

Halos



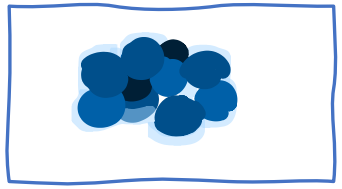
HPV/LSIL
Reactive
Candida
Trichomonas
ASCUS

Single cells high n/c ratio



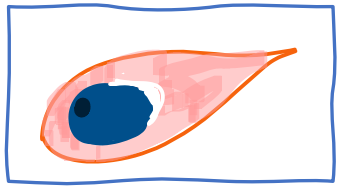
Squamous metaplasia
Reserve cell
Parabasal cell
Atrophic
HSIL
ASC-H
Endometrial
IUD cell

Hyperchromatic crowded groups



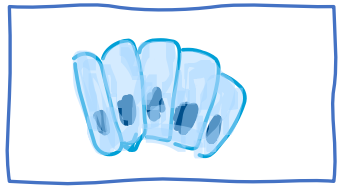
endocervical
Endometrial
HSIL
Lower uterine segment
Atrophy
AGUS
AIS
Adenocarcinoma

Large bizarre



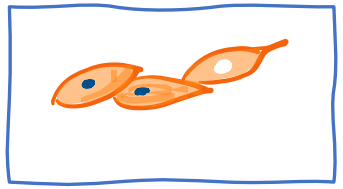
Radiation
Chemotherapy
SCC
Herpes
CMV
HPV/LSIL

Columnar strips



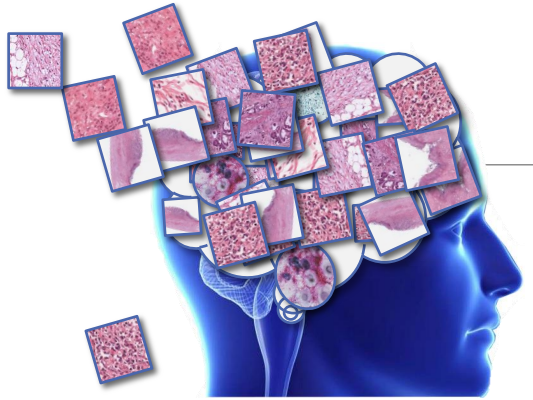
Endocervical
Tubal metaplasia
AIS
AGUS

Keratosis



HPV/LSIL
ASCUS
SCC
Reactive
Prolapse

Pattern recognition at work



Mental image library

Illness scripts

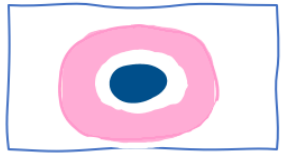
Cue based associations in long term memory

Type 1 thinking, fast, intuitive

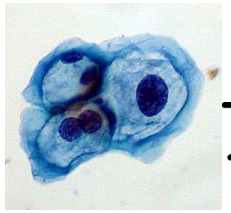
Recognised

Spot diagnosis

Halos



HPV/LSIL
Reactive
Candida
Trichomonas
ASCUS



Pattern processor

Deliberate practice

Differential diagnosis – hypothesis testing

Diagnosis

Not Recognised

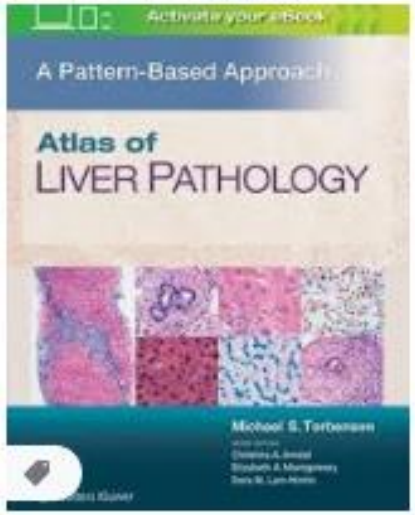
Type 2 thinking, slow, analytical

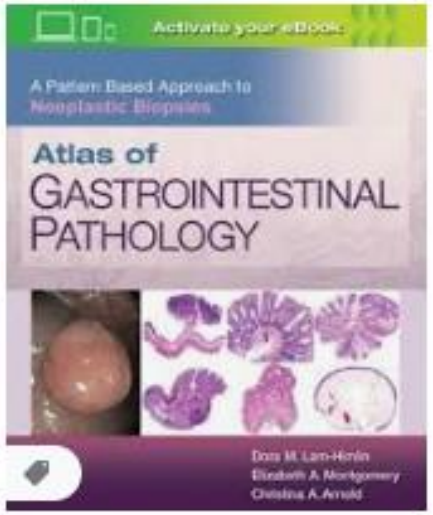
Knowledge acquisition, wallpaper matching, causal reasoning

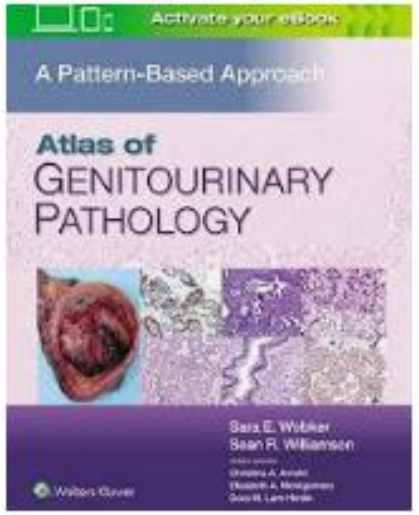
Adapted from Croskerry (2009) ten Cate (2018), Ericsson (2004) and Wiggins (2020)

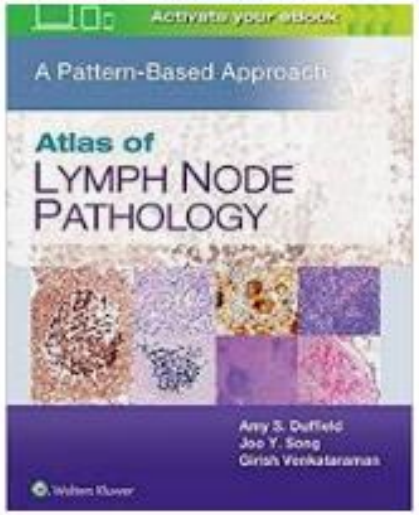
Carrigan A, Charlton A, Kirby K, Wiggins M. Pattern recognition reduces the influence of cognitive bias in histopathology. Applied Ergonomics 2022

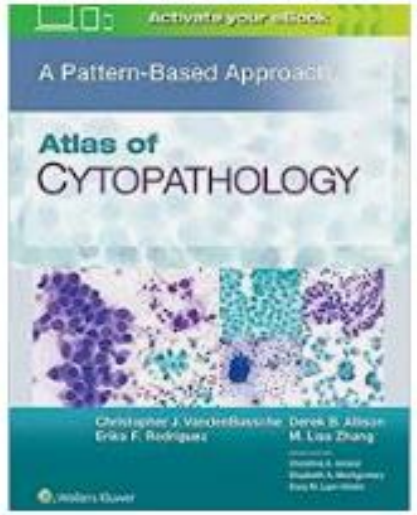
Pattern recognition - Book series – LWW

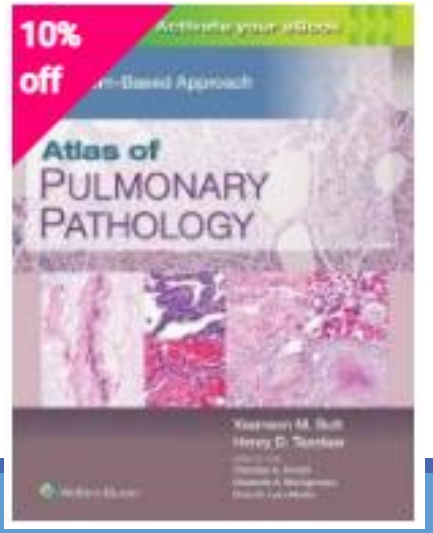


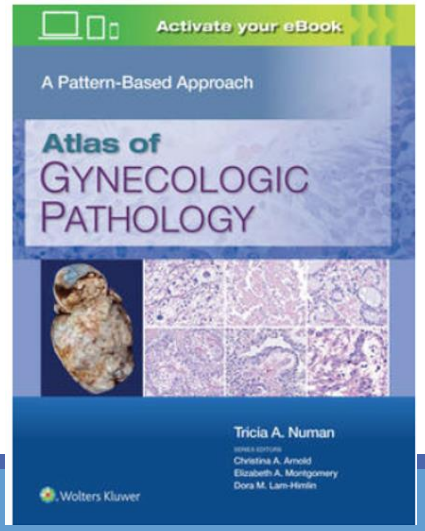




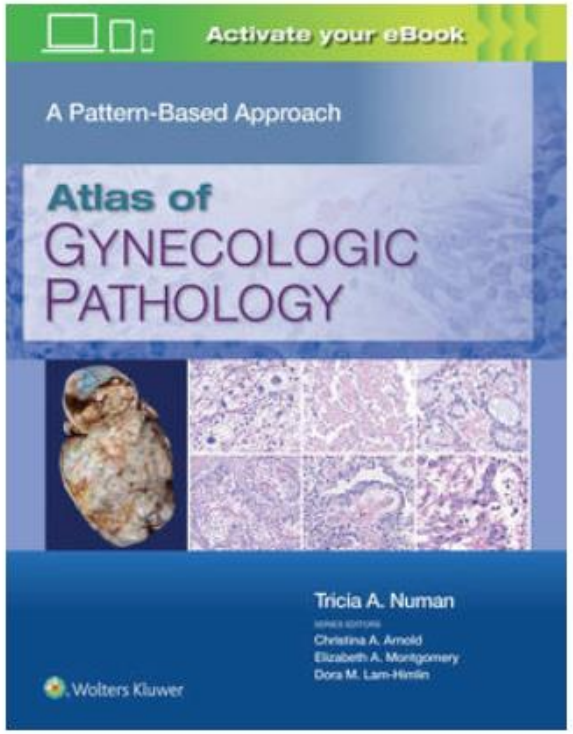








Pattern recognition algorithm for diagnosis– Gynae Pathology



Atlas of Gynecologic Pathology

A Pattern-Based Approach

Edition: 1

(0) Write A Review | Ask A Question |

Vitalsource Interactive eBook	Hardcover Book
$259.99	$259.99

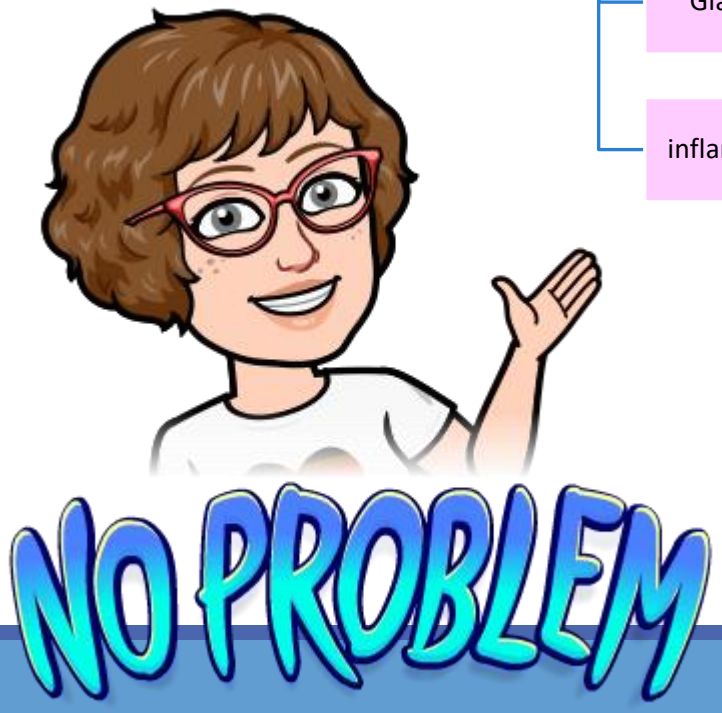
Author(s): Tricia A. Numan MD

ISBN/ISSN: 9781975124762

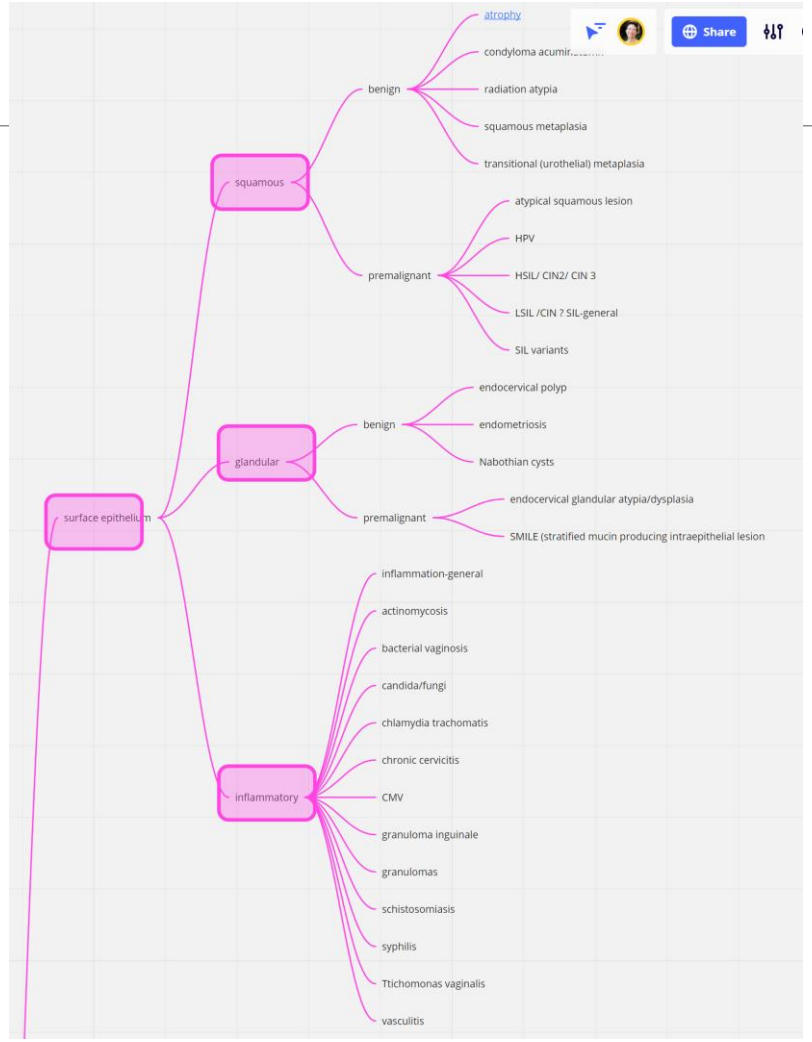
Publication Date: July 31, 2023

Pattern recognition – cervical histology

- cervix
  - Surface epithelium and glands
    - Squamous
    - Glandular
    - inflammatory
  - Stroma
    - Squamous
    - Glandular
    - Papillary
    - Solid/epithelia
    - Mesenchymal/ spindle/mixed
    - Small round blue cell
  - Polyp
    - Squamous
    - Glandular
    - papillary
    - Solid/epithelial
    - Mesenchymal/ spindle/mixed
    - Small round blue cell



Pattern recognition algorithm for diagnosis



https://miro.com/app/board/o9J_lY8qIfo=/

Learning how to learn

Knowledge management & Pattern recognition

YEAR 1-2 REGISTRARS 15 JULY 2022

NCPTS
National Cervical Pathology Training Service

Dr Amanda Charlton
Pathologist
LabPlus
Auckland City Hospital

A/Prof Diane Kenwright
Pathologist
Dept of Pathology and Molecular Medicine
University of Otago, Wellington