Building a Liberated/Open Online Collaborative Pathology Knowledge Base

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Disclosures

I am the founder & CEO of Libre Pathology.

Libre Pathology (librepathology.org), formerly Online Pathology (onlinepathology.org), is a wiki-based open access pathology knowledge base without advertisements and without commercial sponsorship. It is licensed with a creative commons license.

Bottom line: There is no direct personal financial gain.
Overview

Pathology information dissemination.

What is a wiki?

Librepathology.org.

Discussion.
Dissemination of Pathology Information

Textbooks are still considered the standard secondary source.

Web resources:
- Uncommonly link internally.
- Rarely interlink.
- Infrequently have powerful search capabilities.
Wiki is “quick” or “fast”

Websites that are quickly editable.

A tool used to create and manage content.

- Open editorship or closed editorship.
- Private/limited access or public.
- Multitude of wiki software, e.g. MediaWiki, PBworks.
Wikipedia - wide reach

~60,000 hits/month for “pathology”
~65,000 hits/month for “prostate cancer”

http://stats.grok.se/
Wikis can have a wide reach

Wikipedia is so big it is seen as a tool to educate the public about health issues, as it is often used as a source of medical information by the public.

Wikipedia is often used as a source of medical information by physicians.

~ 70% of junior physicians use WP [Hughes et al.]
~ 50% of physicians use WP [Comer].


Wikipedia: a key tool for global public health promotion.


University of Saskatchewan, Saskatoon, SK, Canada.

Abstract
The Internet has become an important health information resource for patients and the general public. Wikipedia, a collaboratively written Web-based encyclopedia, has become the dominant online reference work. It is usually among
Librepathology.org - Beginnings

A wiki started in 2010 to collect nuggets of wisdom and find them when I need them. Initially used to study for exams & link to images (Wikipedia uploads, others). Evolved into notes on things I've seen, things I have read about and how to approach cases.

Virchows Liste

Virchows Liste is a wiki to collect all things pathology. The primary target audience is pathologists and pathologists-in-training, and it is assumed that the reader has some basic medical knowledge.

An effort is made to formulate things so that other physicians and the public at large can gain some insight into the world of pathology.
Overview – Why Libre Pathology?

Comprehensive pathology content.
Pathology images – large number.
Fully searchable.
Summary boxes & sign out reference.
External linking/references.
Data organization – changeable views.
Update-able & edit-able.
Community participation.
Comprehensive pathology content

All common things, most uncommon things and many rare things are found - over 1250 diagnoses covered!
2000+ quality pathology images

Often with low and high magnification views, some gross images
Strong search capability  
Search box on every page.

Search results

Psammoma bodies

Content pages  Multimedia  Help and Project pages  Everything  Advanced

Showing below 27 results starting with #1.

There is a page named "Psammoma bodies" on this wiki.

Page title matches

Psammoma bodies
...rst2 = TY | last3 = Ali | first3 = SZ | title = Significance of 
psammoma bodies in serous cavity fluid: a cytopathologic analysis. |
journal = Cancer | vol ==Conditions with psammoma bodies==
2 KB (236 words) - 17:42, 2 June 2012

Page text matches

Gynecologic cytopathology
*+/[[Psammoma bodies]]..inella | first2 = R. | last3 = Reilly | first3 
= JC | title = Crystalline bodies in cervical smears. Clinicocytopathologic 
 correlation. | journal = Acta Cytol |
40 KB (5,144 words) - 15:45, 30 January 2014

Cytopathology
| Perinuclear blue bodies<br>not seen in lymphoid cells) |
lymphoglandular bodies.<br>dyssynchronous 
24 KB (3,174 words) - 22:44, 20 March 2014

Duodenum
*+/[[Psammoma bodies]] - suggestive of [[somatostatinoma]] and 
[[NF1]].<ref name=pmid21437171>
Searching - alternate terms linked & similar ones disambiguated

"Redirects" of synonyms simplify searches.

“Disambiguate” similar names.
## Diagnosis summary & Sign out reference

*Designed for quick reference*

### Sessile serrated adenoma

- **Diagnosis in short**
  - SSA, H&E stain.

- **Synonyms**
  - sessile serrated lesion,
  - sessile serrated polyp,
  - sessile serrated adenoma/polyp

- **LM**
  - serrated epithelium,
  - crypt base dilation, crypt branching, boot-shaped glands, horizontal glands

- **LM DDx**
  - hyperplastic polyp,
  - tubular adenoma (without dysplasia)

- **Site**
  - colon - usually cecum or ascending colon

- **Associated**
  - colorectal adenocarcinoma,
  - hyperplastic polyposis syndrome, MUTYH polyposis syndrome

- **Prevalence**
  - common

- **Endoscopy**
  - flat, usually > 5 mm, mucinous cap

- **Clin. DDx**
  - normal, hyperplastic poly, other intestinal polyps

### Sign out

#### POLYP, CECUM, POLYPECTOMY:
- Sessile serrated adenoma.
- Negative for dysplasia.

#### POLYP, ASCENDING COLON, POLYPECTOMY:
- Sessile serrated adenoma.
- Negative for dysplasia.

#### POLYP, HEPATIC FLEXURE OF COLON, POLYPECTOMY:
- Sessile serrated adenoma.
- Negative for dysplasia.

### Dysplasia present

#### POLYP, ASCENDING COLON, POLYPECTOMY:
- Sessile serrated adenoma with dysplasia.

**Note:**
- The above exactly mirrors the Canadian consensus.[7]

**Micro**

The section shows a small polyoid fragment of colonic mucosa with a serrated epithelium that focally extends to the crypt base. Several dilated crypt bases are seen. One horizontal crypt and one boot-shaped crypt are present. The epithelium matures to the surface. A small amount of submucosa is present and contains a benign lymphoid aggregate.

### References


External resources - speedy

If you want more info or images... you'll usually find links!
Data organization

System-based, organ-based, morphological.

A practical histomorphologic differential diagnosis of malignancy

General morphologic DDx of malignancy

- Malignancy

- Large epithelioid tumours
- Spindle cell tumours
- Small blue cell tumours
- Pleomorphic tumours

Modified general morphologic DDx of malignancy

- Malignancy

- Large epithelioid tumours
- Spindle cell tumours
- Small blue cell tumours
- Pleomorphic tumours
- Clear cell tumours
- Myxoid tumours

The above is more useful than the general clinico-histomorphologically motivated differential diagnosis of malignancy.

Differential diagnosis by site

Main article: Short power list

It is essential to have a concept of what is common. The short power list gives a short differential diagnosis for the common sites.

Main article: Long power list

The long power list is a longer list for the common sites.
Data Organization – long lists

“Smart” tables in a long morphologic differential diagnosis.

### A long differential diagnosis of small blue cell tumours

Adapted from Miller with modifications[^3]

<table>
<thead>
<tr>
<th>Tumour</th>
<th>Group</th>
<th>Notes/comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinar cell carcinoma</td>
<td>carcinoma</td>
<td></td>
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<tr>
<td>Adenoid cystic carcinoma</td>
<td>carcinoma</td>
<td></td>
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<tr>
<td>Adenosarcoma</td>
<td>sarcoma</td>
<td>glandular component may not be sampled</td>
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<tr>
<td>Angiomyofibroblastoma</td>
<td>soft tissue lesions</td>
<td></td>
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<tr>
<td>Basaloid carcinoma / Basal cell carcinoma</td>
<td>carcinoma</td>
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<td>Carcinoma not otherwise specified</td>
<td>carcinoma</td>
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<tr>
<td>Central neurocytoma</td>
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<td>Cutaneous adnexal tumours (spiradenoma, acrosiroma)</td>
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<td>Cutaneous myoepithelioma</td>
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<td>Desmoplastic small round cell tumour</td>
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<td>Endometrial stromal sarcoma</td>
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<td>Epithelioid hemangioendothelioma</td>
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<td>Ewing sarcoma / PNET</td>
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<td>Extramedullary leukemia</td>
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<td>Fetal or genital rhabdomyoma</td>
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<td>Gomangiopericytoma</td>
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<td>Gomus tumour</td>
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<td>Granuloma annulare</td>
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<td>Granulosa cell tumour</td>
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<td>Gynandroblastoma</td>
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<tr>
<td>Mesenchymal chondrosarcoma</td>
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<td>[^4] chondro-osseous tumours</td>
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<tr>
<td>Small cell mesothelioma</td>
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</tr>
</tbody>
</table>
Data organization - trees with links

Approaches to problems – quick access to detail knowledge

Papillary lesions

- Myoepithelial cells present
  - Unremarkable papillae
  - Benign intraductal papilloma
  - High grade atypia
  - DCIS in papilloma
    - >3 mm extent
      - DCIS in papilloma
    - <3 mm extent
      - ADH in papilloma
  - Atypia or arch. abnorm. or cellular proliferation
    - Low grade atypia or abnorm. arch.
    - Only cellular proliferation
      - FEHUT in papilloma
        - >3 mm extent
          - DCIS in papilloma
        - <3 mm extent
          - ADH in papilloma
  - Myoepithelial cells absent
    - Neoplastic cells present
      - Intracystic (encapsulated) papillary ca.

Notes:
- Adapted from Mulligan & O'Malley.[8]
- The most important decision is the first one: myoepithelial cells present vs. absent.
- abnorm. arch. = abnormal architecture present.
- DCIS = ductal carcinoma in situ.
- FEHUT = florid epithelial hyperplasia of the usual type.
- extent refers to the size of the abnormal cell population within the papillary lesion.
The details of all edits are kept (1) who changed it, (2) what was changed, (3) when it was done.
Virtual case simulator
Formerly “Onlinepathology.org”

Objectives:
• Learning/continuing medical education.
• Maintenance of competence.
• Share interesting cases.

Designed to reproduce the decision-making in anatomical pathology.

Virtual ordering of stains, IHC molecular tests – with instant results.

Currently ~ 75 cases.
Virtual case simulator

### Case 2

**Clinical history**
35 year old man, duodenal mass.

**Primary image**

![Primary image](image_url)

<table>
<thead>
<tr>
<th>Magnification</th>
<th>Expand</th>
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<tbody>
<tr>
<td>Low magnification, H&amp;E stain.</td>
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<td>Intermediate magnification</td>
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<tr>
<td>Very high magnification</td>
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</table>

**Additional tests**

**More history**

**Ask a colleague**

**Stains**

- Alcian blue/PAS to Blubin
- Colloidal iron to Fontana-Nason
- Cyanin to Gomori
- MUC to Mucicarmine
- Oil red O to Prussian blue
- Baticulin to Ziehl Neelsen

**BIC**

- Undiff. [Expand]
- Epithelial [Expand]
- Mesenchymal & neural markers
- Lymphoid [Expand]
- Other [Expand]
- Viral & endocrine markers

**Differential diagnosis**

**Diagnosis**
Virtual case simulator

Additional tests [edit]

More history [edit]

History of hemangioblastoma.

Ask a colleague [edit]

Stains [edit]

Alcian blue/PAS to Bilirubin
Colloidal iron [Expand] to Fontana-Masson
Gallyas [Expand] to Gremelius
JHMS to [Expand] Mucicarmine
Oil red O [Expand] to Prussian blue
Reticulin [Expand] to Ziehl-Neelsen

IHC [edit]

Undiff. [Expand] Markers
Epithelial [Expand] markers
Mesenchymal & [Expand] neural markers
Lymphoid [Expand] markers
Other [Expand] markers
Viral & endocrine markers

Differential diagnosis [edit]

Differential diagnosis

Diagnosis [edit]

Paraganglioma

Note: Further clinical information not provided was... the individual has von Hippel-Lindau disease!

Other cases [edit]

Case navigation box

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<tr>
<td>1.7</td>
<td>12</td>
<td>Autopsy pathology [y, y, y, y]</td>
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</table>
Virtual case simulator
Cases organized by system and difficulty.

Do cases at your level!

Target audience:
• General pathologists/community pathologists.
• Residents (junior & senior).
• Fellowship trained pathologists looking at their subspecialty.
Libre Pathology – today & beyond

• Librepathology.org – today.
• Current site objectives.
• Raising awareness.
• Getting involved.
• Vision.
• Discussion.
Librepathology.org - Today

- 1200+ content pages (over 5400 pages).
- 1250+ unique diagnoses.
- 1000s of references with external links.
- Over 500 pathology pages have at least one pathology image.
- Over 2000 pathology images.
- 75 interactive virtual cases.
- Creative Commons license.
- Links to external images.
- Mobile device/smart phone friendly view.
- Information/diagnosis summary boxes.
Current site objectives

- Excellent free (ergo “libre”) secondary source (no original research).
- Further evidence-based medicine.
- Inclusive (community & academia) with flat hierarchy.
- Neutral point of view - significant minority views welcome (e.g. WHO vs. EIN system).
- Readable/“consume-able” by an “educated” general audience.
Raising awareness

“Open access” the site. (July)

Present at Informatics Group at CAP meeting in Toronto (Today).

Platform presentation at the CAP meeting – on the virtual case simulator (Monday).

Add grossing guide for Genitourinary specimens (August/September).
Getting involved

Try it out – if you have used Wikipedia: the skills are transferable.

Spread the word.

Send me an email (michael@librepathology.org) with suggestions.

Try editing – I can set you up in a minute.

Vampire recruitment (planned).
Long term vision

Make up-to-date easy-to-access pathology information freely available to all that are interested … all you need is an internet connection!

Rocky Harbour, NL
Acknowledgments

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Dr. Stephen S. Raab (MUN)
Dr. Frank X. Torres (Eastern Health)
Others ...
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