

Supplementary Materials for LLM-generated Rewrite and Context Modulation for Enhanced Vision Language Models in Digital Pathology

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A. LLM Input Prompts for Various Tasks

A.1. LLM Input Prompts Utilized for Generating General Language Rewrites

- **User:** You are a pathologist. Can you rephrase the following sentence? This sentence is imperfect and might have non-sensical words, please ignore those words. Feel free to use synonyms and additional pathology knowledge about the medical terms. Sentence to be rephrased: Peritoneum, Day 4 These two biopsies (1 & 2) were taken from the same patient. What is your DailyDx of each of these peritoneal biopsies? What other finding is most likely to be present in this patient? Answers & quick facts tomorrow! UMichPath SurgPath.
- **Assistant:** What can be said regarding the peritoneal biopsy of this patient?
- **User:** Can you rephrase this sentence? Sentence to be rephrased: Teenager with a large hemispheric tumor.'PNET'-like morphology, with Olig2 negative and ATRX loss. What is the most likely diagnosis?PathTwitter neuropath neurotwitter
- **Assistant:** ATRX, a chromatin remodeler protein, is recurrently mutated in H3F3A-mutant pediatric glioblastoma.
- **User:** Can you rephrase this sentence? Sentence to be rephrased: Nephrogenic systemic fibrosis is a fibrotic disorder with deep involvement that goes down to the fascia.

- **Assistant:** Nephrogenic systemic fibrosis is a rare disease that occurs mainly in people with advanced kidney failure with or without dialysis.
- **User:** Can you rephrase this sentence? Sentence to be rephrased: [NEW SENTENCE]

A.2. LLM Input Prompts Utilized for Cell Context Specific Language Rewrites

- **User:** You are a pathologist. Your job is to extract cell related information from a sentence. You should identify cell names mentioned in the sentence and output them. If there is no cell related information, output 'None'. Do not exceed 10 words. Sentence: The cells outlined in green form the acini of the pancreas and the blue arrow indicates a centroacinar cell.
- **Assistant:** Centroacinar cells.
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: Esophageal biopsy shows eosinophils and basal zone hyperplasia.
- **Assistant:** Eosinophils.
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: Pigmented lesion from the floor of the mouth with a previous history of melanoma. What is your diagnosis of this pigmented lesion?? UForalpath headandneck-path UF HandNpathology ENTpath.

- **Assistant:** None
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: Tumor of lingual dorsum in a 59 y-o male. Ulcerated epithelium replaced by a thick fibrinopurulent membrane (1) and a underlying band of acute inflammatory cells (2). A granulation-like tissue form the bulk of the tumor (3), with proliferation of endothelial cells (4). oralpath
- **Assistant:** Acute inflammatory cells and proliferating (multiplying) endothelial cells.
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: Renal bx in the setting of multicentric castleman/TAFRO syndrome. Glomerular limited chronic active microangiopathy. GBM double contours/remodeling and endotheliosis. renalpath
- **Assistant:**None
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: Description of the anatomy of the adrenal gland, including the capsule, cortex, and medulla.
- **Assistant:** None
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: The presence of large myxoid-chondroidy nodules and sweat ducts embedded in myxoid stroma suggests a mixed tumor or chondroid syringoma.
- **Assistant:** None
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: Discussion of small cell carcinoma and its characteristics.
- **Assistant:** None
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: This one is a bit trickier, but still classy! conchal cymba lesion. Look how pagetoid those cells are! Ddx? And whats your bet?Dermpath pathology dermatology dermtwitter

- **Assistant:** Pagetoid cells.
- **User:** Can you extract cell related information from the sentence below? If no cell information is present, output 'None'. Do not exceed 10 words. Sentence: [NEW SENTENCE]

A.3. LLM Input Prompts Utilized for Organ Context Specific Language Rewrites

- **User:** You are a pathologist. Can you infer which organ the sentence is referring to and write a sentence describing a pathology image coming from that particular organ? Input sentence: Peritoneum, Day 4 These two biopsies (1 & 2) were taken from the same patient. What is your DailyDx of each of these peritoneal biopsies? What other finding is most likely to be present in this patient? Answers & quick facts tomorrow! UMichPath SurgPath.
- **Assistant:** This is an H&E slide from the peritoneum.
- **User:** Can you infer the organ from this sentence and write a new sentence? Input sentence: Teenager with a large hemispheric tumor.'PNET'-like morphology, with Olig2 negative and ATRX loss. What is the most likely diagnosis?PathTwitter neuropath neurotwitter
- **Assistant:** Brain tissue is clearly seen in this pathology slide.
- **User:** Can you infer the organ from this sentence and write a new sentence? Input sentence: Nephrogenic systemic fibrosis is a fibrotic disorder with deep involvement that goes down to the fascia.
- **Assistant:** Patient's kidney sample is under the microscope.
- **User:** Can you infer the organ from this sentence and write a new sentence? Input sentence: [NEW SENTENCE]

A.4. LLM Input Prompts Utilized for Disease Context Specific Language Rewrites

- **User:** You are a pathologist, who can understand if a sentence is talking about the presence of a disease in a pathology image. The sentence may have indications such as the mention of some genetic markers like gene mutations, or some morphological information regarding tumor presence. Your role is to categorize the sentence as talking about 'diseased', or 'normal' pathology image.Can you infer if the sentence talks about presence of a disease or not from the sentence below? If the sentence talks about any particular disease, output 'diseased'. Only output 'normal' if the sentence

does not describe a pathology or it says that the features are not evident of disease. Please limit your answer to one word from the list: diseased and normal. Sentence: Peritoneum, Day 4 These two biopsies (1 & 2) were taken from the same patient. What is your DailyDx of each of these peritoneal biopsies? What other finding is most likely to be present in this patient? Answers & quick facts tomorrow! UMichPath SurgPath.

- **Assistant:** normal
Explanation: Biopsy results are unclear.
- **User:** Can you infer if the sentence talks about presence or description of a disease or its lack thereof from the sentence below? Please limit your answer to one word from the list: diseased and normal. Sentence: Teenager with a large hemispheric tumor.'PNET'-like morphology, with Olig2 negative and ATRX loss. What is the most likely diagnosis?PathTwitter neuropath neurotwitter
- **Assistant:** diseased
Explanation: The disease is the hemispheric tumor.
- **User:** Can you infer if the sentence talks about presence or description of a disease or its lack thereof from the sentence below? Please limit your answer to one word from the list: diseased and normal.Sentence: Nephrogenic systemic fibrosis is a fibrotic disorder with deep involvement that goes down to the fascia.
- **Assistant:** diseased
Explanation: The disease is the nephrogenic systemic fibrosis.
- **User:** Can you infer if the sentence talks about presence or description of a disease or its lack thereof from the sentence below? Please limit your answer to one word from the list: diseased and normal. Sentence: The breast tissue shows hyperplasia, which is a normal finding in pregnancy.
- **Assistant:** normal
Explanation: Sentence mentions that the hyperplasia is normal in pregnancy.
- **User:** Can you infer if the sentence talks about presence or description of a disease or its lack thereof from the sentence below? Please limit your answer to one word from the list: diseased and normal. Sentence The immunocytochemistry of IDH1 in MG63 and U2OS.IDH1 is specifically detected in the cytoplasm of both osteosarcoma cell lines MG63 and U2OS.(A) Expression of IDH1 in U2OS, × 200; (B) Expression of IDH1 in MG63,× 200; (C) Expression of IDH1 in U2OS,× 400; (D) Expression of IDH1 in MG63,× 400.

- **Assistant:** diseased
Explanation: IDH is a gene that is present in osteosarcoma which is a type of cancer. In (A) it mentions that the IDH is expressed.
- **User:** Can you infer if the sentence talks about presence or description of a disease or its lack thereof from the sentence below? Please limit your answer to one word from the list: diseased and normal. Sentence: [NEW SENTENCE]

A.5. LLM Input Prompts Utilizedfor Generating Zero-shot Classification Prompt Sets

A.5.1 Bach

- Prompt for **benign breast tissue** class:
 - **User:** Can you generate a single sentence of less than 15 words describing a pathology image that shows non malignant benign breast tissue?
 - **Assistant:** The breast tissue appears benign.
 - **User:** Can you generate another sentence of less than 15 words describing a pathology image that shows non malignant benign breast tissue?
 - **Rest of the provided assistant answers for every User question:**
 - * Pathology specimen is taken from benign breast tissue.
 - * H&E stained tile shows benign breast tissue.
 - * The microscopic image of the breast is benign.
- Prompt for **malignant in-situ carcinoma in breast** class:
 - **User:** Can you generate a single sentence of less than 15 words describing a pathology image that shows malignant in situ carcinoma in breast tissue?
 - **Assistant:** The breast specimen is diagnosed with malignant in situ carcinoma.
 - **User:** Can you generate another sentence of less than 15 words describing a pathology image that shows malignant in situ carcinoma in breast tissue?
 - **Rest of the provided assistant answers for every User question:**
 - * The cancer is contained within the breast tissue and it's malignant.
 - * H&E stained tile from the breast is apparent of a malignant in situ carcinoma.

- * The microscopic image of the breast reveals malignant in situ carcinoma.
- Prompt for **malignant invasive carcinoma in breast** class:
 - **User:** Can you generate a single sentence of less than 15 words describing a pathology image that shows malignant invasive carcinoma in breast tissue?
 - **Assistant:** The breast specimen is diagnosed with malignant invasive carcinoma.
 - **User:** Can you generate another sentence of less than 15 words describing a pathology image that shows malignant invasive carcinoma in breast tissue?
 - **Rest of the provided assistant answers for every User question:**
 - * The cancer is invasive beyond the breast tissue and it's malignant.
 - * H&E stained tile from the breast is apparent of a malignant invasive carcinoma.
 - * The microscopic image of the breast reveals malignant invasive carcinoma.

- Prompt for **normal breast tissue** class:
 - **User:** Can you generate a single sentence of less than 15 words describing a pathology image that shows healthy and normal breast tissue?"
 - **Assistant:** The breast tissue appears normal.
 - **User:** Can you generate another sentence of less than 15 words describing a pathology image that shows shows healthy and normal breast tissue?
 - **Rest of the provided assistant answers for every User question:**
 - * Pathology specimen is taken from a healthy breast.
 - * H&E stained tile shows healthy breast tissue.
 - * The microscopic image of the breast is normal.

A.5.2 Mhist

- Examples for **hyperplastic polyp** class:
 - The sample shows hyperplastic polyp.
 - The H&E stained tile reveals noncancerous growth named hyperplastic polyp.
 - The biopsy from the colorectal tissue reveals hyperplastic polyp.

- Hyperplastic polyp can be seen in the colorectal tissue.

- Examples for **sessile serrated adenoma** class:
 - The sample is diagnosed with sessile serrated adenoma.
 - Sessile serrated polyps are a recently recognized type of neoplastic polyp.
 - Colorectal biopsy is diagnosed with sessile serrated adenoma.
 - The H&E stained sample is indicative of sessile serrated adenoma.

A.5.3 Databiox

- Examples for **well differentiated bloom richardson grade one** class:
 - This image shows invasive ductal carcinoma of well differentiated bloom richardson grade one.
 - The H&E slide image is diagnosed with well differentiated bloom richardson grade one IDC.
 - The cancer is well differentiated bloom richardson grade one.
 - Breast surgery revealed well differentiated bloom richardson grade one IDC.
- Examples for **moderately differentiated bloom richardson grade two** class:
 - This image shows invasive ductal carcinoma of moderately differentiated bloom richardson grade two.
 - The H&E slide image is diagnosed with moderately differentiated bloom richardson grade two IDC.
 - The cancer is moderately differentiated bloom richardson grade two.
 - Breast surgery revealed moderately differentiated bloom richardson grade two IDC.
- Examples for **poorly differentiated grade three** class:
 - This image shows invasive ductal carcinoma of poorly differentiated grade three.
 - The H&E slide image is diagnosed with poorly differentiated grade three IDC.
 - The cancer is poorly differentiated grade three.
 - Breast surgery revealed poorly differentiated grade three IDC.

A.5.4 Lc Lung

- Examples for **lung adenocarcinoma** class:
 - This image shows lung adenocarcinoma.
 - This H&E stained tile of lung is diagnosed with adenocarcinoma.
 - Adenocarcinoma can be inferred in the histopathology specimen from the lung.
 - The biopsy shows adenocarcinoma in the left lung.
- Examples for **benign lung** class:
 - This image shows a benign lung tissue.
 - This H&E stained tile of lung is benign.
 - The benign lung tissue is apparent from the biopsy.
 - This is an image of benign lung.
- Examples for **lung squamous cell carcinoma** class:
 - This image shows a lung squamous cell carcinoma.
 - This H&E stained tile of lung is apparent of squamous cell carcinoma.
 - The biopsy revealed squamous cell carcinoma in the right lung.
 - The surgical resection of the left lung resulted in squamous cell carcinoma diagnosis.

A.5.5 Lc Colon

- Examples for **colon adenocarcinoma** class:
 - This image shows colon adenocarcinoma.
 - This H&E stained tile of colon is diagnosed with adenocarcinoma.
 - Adenocarcinoma can be inferred in the histopathology specimen from the colon.
 - The biopsy shows adenocarcinoma in the colon.
- Examples for **benign colonic tissue** class:
 - This image shows benign colonic tissue.
 - This H&E stained tile of the colon is benign.
 - The histopathology specimen from the colon appears benign.
 - The biopsy doesn't show abnormalities and the colon tissue appears benign.

A.5.6 Pannuke Organ

- Examples for **lung** class:
 - This is an image originating from the lung.
 - An H&E stained lung sample is clearly seen under the microscope.
 - This pathology image is from a lung biopsy.
 - The lung tissue is observed.
- Examples for **thyroid** class:
 - This is an image originating from the thyroid.
 - An H&E stained thyroid sample is clearly seen under the microscope.
 - This pathology image is from a thyroid biopsy.
 - The thyroid tissue is observed.
- These examples are repeated for breast, uterus, skin, esophagus, liver, testis, ovarian, kidney, prostate, stomach, adrenal gland, bile duct, cervix, head and neck, bladder, pancreas and colon classes.

A.5.7 Pannuke Cell

- Examples for **neoplastic cell** class:
 - In this image neoplastic cells are clearly observed.
 - An H&E stained slide contains neoplastic cells.
 - The biopsy reveals a groups of neoplastic cells.
 - Under the microscope, neoplastic cells can be identified.
- These examples are repeated for inflammatory cell, connective soft tissue cell, dead cells and epithelial cell classes.

A.5.8 Ocelot Organ

- Examples for **bladder** class:
 - This is an image originating from the bladder.
 - An H&E stained bladder sample is clearly seen under the microscope.
 - This pathology image is from a bladder biopsy.
 - The bladder tissue is observed.
- These examples are repeated for endometrium, head and neck, kidney, prostate and stomach classes.

A.5.9 Ocelot Cell

- Examples for **normal cell** class:
 - In this image normal cells are clearly observed.
 - An H&E stained slide contains normal cells.
 - The biopsy reveals a groups of normal cells.
 - Under the microscope, normal cells can be identified.
- These examples are repeated tumor cell class.

A.5.10 Camelyon

- Examples for **normal lymph node** class:
 - The lymph biopsy is normal.
 - The pathology image shows normal lymph node.
 - H&E stained tile is from a healthy lymph node.
 - Healthy lymph node is observed under the microscope.
- Examples for **lymph node containing metastatic tumor tissue** class:
 - The lymph node biopsy reveals metastatic tumor tissue.
 - The metastatic tumor tissue if seen under the microscopic image of the lymph node.
 - The H&E stained tile shows lymph node containing metastatic tumor tissue.
 - Lymph node has metastatic tumor tissue.

A.5.11 Sicap

- Examples for **benign glands** class:
 - This image shows benign glands in the prostate.
 - The biopsy from the prostate reveals benign glands.
 - The benign glands are visible in the H&E stained sample from the prostate.
 - The pathology specimen shows benign glands in the prostate.
- Examples for **atrophic dense glands** class:
 - This image shows atrophic dense glands in the prostate.
 - The biopsy from the prostate reveals atrophic dense glands.
 - The atrophic dense glands are visible in the H&E stained sample from the prostate.

- The pathology specimen shows atrophic dense glands in the prostate.

- Examples for **cribriform ill-formed fused papillary patterns** class:

- This image shows cribriform ill-formed fused papillary patterns in the prostate.
- The biopsy from the prostate reveals cribriform ill-formed fused papillary patterns.
- The cribriform ill-formed fused papillary patterns are visible in the H&E stained sample from the prostate.
- The pathology specimen shows cribriform ill-formed fused papillary patterns in the prostate.

- Examples for **isolated nest cells without lumen roseting patterns** class:

- This image shows isolated nest cells without lumen roseting patterns in the prostate.
- The biopsy from the prostate reveals isolated nest cells without lumen roseting patterns.
- The isolated nest cells without lumen roseting patterns are visible in the H&E stained sample from the prostate.
- The pathology specimen shows isolated nest cells without lumen roseting patterns in the prostate.

A.5.12 Crc

- Examples for **adipose** class:

- This image shows adipose tissue in the colon.
- The H&E stained tile is from the adipose tissue in the colorectal area.
- The biopsy is taken from the adipose tissue in the colon.
- Adipose tissue looks normal in the colon sample.

- Examples for **debris** class:

- The image shows debris in the colon.
- The pathology sample from the colon shows debris.
- Debris affects the correct diagnosis of the colon sample.
- Debris can be seen in the H&E stained tile of the colon.

- Examples for **lymphocytes** class:

- A lymphocyte is a type of white blood cell.

- Lymphocytes are seen under the microscopic image of the colon.
- The colorectal specimen reveals lymphocytes.
- The H&E stained image reveals lymphocytes in the colon sample.

- Examples for **mucus** class:

- Mucus is clearly visible in the microscopic image of the colon.
- The H&E stained image of the colon shows mucus.
- Mucus in the colon is normal.
- Mucus is present in the microscopic image of the colorectal tissue.

- Examples for **smooth muscle** class:

- This biopsy is taken from the smooth muscle in the colorectal area.
- Smooth muscle appearance is normal for colon.
- The pathology image is from the smooth muscle in the colon.
- Colorectal sample shows smooth muscle.

- Examples for **normal colon mucosa** class:

- The sample is from normal colon mucosa.
- The H&E stained image shows normal colon mucosa.
- Normal colon mucosa would look like this under the microscope.
- The pathology specimen is from normal colon mucosa.

- Examples for **cancer associated stroma** class:

- The colorectal biopsy was diagnosed with cancer associated stroma.
- Cancer associated stroma is the official diagnosis of the colon sample.
- Colorectal tissue showed cancer associated stroma.
- The pathology is cancer associated stroma.

- Examples for **colorectal adenocarcinoma epithelium** class:

- This is the typical manifestation of the colorectal adenocarcinoma epithelium.

- The tile centers around colorectal adenocarcinoma epithelium.
- H&E stained colorectal sample shows colorectal adenocarcinoma epithelium.
- Colorectal adenocarcinoma epithelium is very visible.

A.5.13 Skin

- Examples for **necrosis** class:

- This is an image of necrosis in the skin tissue.
- This H&E stained tile of skin shows necrosis.
- Dead cells in the skin sample form a big necrotic patch.
- The biopsy of the skin reveals necrotic tissue.

- Examples for **skeletal muscle** class:

- This is an image of skeletal muscle taken from skin biopsy.
- This H&E stained tile shows skeletal muscle.
- The specimen taken from skin appears as skeletal muscle.
- The biopsy of the skin reveals skeletal muscle.

- Examples for **eccrine sweat glands** class:

- This is an image of eccrine sweat glands taken from skin biopsy.
- This H&E stained tile shows eccrine sweat glands.
- The specimen taken from skin appears as eccrine sweat glands.
- Eccrine sweat glands are important anatomical structures, as seen in the image.

- Examples for **vessels** class:

- This is an image of vessels seen from skin biopsy.
- This H&E stained tile shows vessels.
- The specimen taken from skin is focused on vessels.
- Vessels are important anatomical structures, as seen in the image.

- Examples for **elastosis** class:

- Elastosis is thickening of elastic fibers in the skin.
- This H&E stained tile shows elastosis condition in the skin.

- Degeneration of the elastic fibers is indicative of elastosis in the skin.
- This pathology slide shows elastosis in the skin.
- Examples for **chondral tissue** class:
 - The skin biopsy shows chondral tissue.
 - This H&E stained tile is centered around chondral tissue.
 - The specimen is acquired from skin and it reveals chondral tissue.
 - This pathology slide is of chondral tissue.
- Examples for **hair follicle** class:
 - The skin biopsy shows hair follicle.
 - This H&E stained tile is of hair follicles.
 - The specimen is acquired from skin and it reveals healthy hair follicles.
 - Hair follicles can be clearly seen under the microscopic image.
- Examples for **epidermis** class:
 - The epidermis is the top layer of the skin.
 - The epidermis is seen in this pathology specimen taken from the skin.
 - The H&E stained image highlights epidermis in the skin.
 - Biopsy of the skin is taken from the epidermis.
- Examples for **nerves** class:
 - The biopsy of the skin shows nerves.
 - Nerves are clearly visible in the microscopic image of the skin.
 - The pathology specimen shows nerves.
 - Nerves are apparent in the skin sample.
- Examples for **subcutis** class:
 - Subcutis tissue is the deepest layer of your skin.
 - The pathology image shows subcutic tissue.
 - The skin biopsy reveals subcutis tissue
 - The H&E stained tile shows the subcutis in the skin.
- Examples for **dermis** class:
 - Dermis is the inner layer of the two main layers of the skin.
 - The pathology image shows dermis.
- Dermis is apparent in the skin biopsy.
- The H&E stained tile is from the dermis.
- Examples for **sebaceous glands** class:
 - Sebaceous glands are microscopic glands that secrete sebum.
 - Sebaceous glands are seen in the H&E stained tile.
 - The pathology image is from sebaceous glands in the skin.
 - Skin biopsy reveals healthy sebaceous glands.
- Examples for **squamous cell carcinoma** class:
 - The skin biopsy is diagnosed as squamous cell carcinoma.
 - Squamous cell carcinoma is the apparent diagnosis from the pathology specimen.
 - H&E stained tile shows squamous cell carcinoma.
 - Squamous cell carcinoma of the skin is a type of cancer.
- Examples for **melanoma in-situ** class:
 - Melanoma in situ is also called stage 0 melanoma.
 - The skin biopsy is diagnosed as melanoma in situ.
 - The pathology tile shows melanoma in situ in the skin.
 - The abnormality in the microscopic image is melanoma in situ.
- Examples for **basal-cell carcinoma** class:
 - Basal cell carcinoma is a type of skin cancer.
 - Basal cell carcinoma is the diagnosis.
 - Skin biopsy reveals basal cell carcinoma.
 - The pathology tile shows basal cell carcinoma.
- Examples for **naevus** class:
 - The H&E stained tile shows naevus in a skin biopsy.
 - The naevus is a birthmark or mole in the skin.
 - The pathology tile shows naevus.
 - The naevus is seen in the specimen from the skin.

A.5.14 Skin Tumor

- Examples for **squamous cell carcinoma** class:
 - The skin biopsy is diagnosed as squamous cell carcinoma.
 - Squamous cell carcinoma is the apparent diagnosis from the pathology specimen.
 - H&E stained tile shows squamous cell carcinoma.
 - Squamous cell carcinoma of the skin is a type of cancer.
- Examples for **melanoma in situ** class:
 - Melanoma in situ is also called stage 0 melanoma.
 - The skin biopsy is diagnosed as melanoma in situ.
 - The pathology tile shows melanoma in situ in the skin.
 - The abnormality in the microscopic image is melanoma in situ.
- Examples for **basal cell carcinoma** class:
 - Basal cell carcinoma is a type of skin cancer.
 - Basal cell carcinoma is the diagnosis.
 - Skin biopsy reveals basal cell carcinoma.
 - The pathology tile shows basal cell carcinoma.
- Examples for **naevus** class:
 - The H&E stained tile shows naevus in a skin biopsy.
 - The naevus is a birthmark or mole in the skin.
 - The pathology tile shows naevus.
 - The naevus is seen in the specimen from the skin.

A.5.15 Renal Cell

- Examples for **red blood cell** class:
 - The pathology image shows red blood cells.
 - Blood cells appear red in the H&E stained image.
 - Red blood cells are clustered together in the specimen.
 - The biopsy is centered around the red blood cells.
- Examples for **renal cancer** class:
 - The pathology image shows renal cancer.

- The biopsy from the renal tissue revealed cancer.
 - Abnormal cell growth in the specimen is indicative of cancer.
 - Renal cancer is the first diagnosis that comes to mind, after seeing this microscopic image.
- Examples for **normal renal tissue** class:
 - The pathology image shows normal renal tissue.
 - The renal tissue under the microscope appears normal.
 - Renal biopsy did not show pathology and revealed normal tissue.
 - A healthy and normal renal tissue looks like this in H&E stained slides.
 - Examples for **torn adipose necrotic tissue** class:
 - The pathology image shows torn adipose necrotic tissue.
 - The H&E stained section is from torn adipose necrotic tissue.
 - In the torn adipose tissue there is apparent necrosis.
 - The biopsy showed torn adipose necrotic tissue.
 - Examples for **muscle fibrous stroma blood vessel** class:
 - The pathology image shows muscle fibrous stroma blood vessels.
 - The H&E stained section is from muscle fibrous stroma blood vessels.
 - The biopsy shows muscle fibrous stroma blood vessels.
 - Under the microscope muscle fibrous stroma blood vessels can be appreciated.

B. Manual Evaluation for Hallucinations in Language Rewrites

Table 1. Manual evaluation results for hallucinations in language rewrites. The first column shows the original captions, the second column presents the Mistral rewrites, and the third column provides the manual evaluation of hallucinations, categorized as: None, Medically Accurate Additional Information, and Yes (hallucinations present). Detailed explanations for non-trivial assessments are included.

Original Caption	Mistral Rewrite	Hallucination
Establishment and characterization of a rat anti-human CLDN9 mAb. (A) Topology of CLDN9 and amino acid sequences of the C-terminal cytoplasmic domains of human CLDN9 and the corresponding regions of the closely related CLDNs. Conserved amino acids are displayed in red. The antigen region is highlighted in yellow. (B) Western blot and (C) immunohistochemical analyses indicating the specificity of the rat anti-human CLDN9 mAb. 293T cells were transfected with individual CLDN expression vectors and subjected to analyses (scale bar, 50 μ m). (D) Localization of CLDN9 in Ishikawa cells co-transfected with CLDN9 and Lamin-RFP. Arrowheads indicate CLDN9-immunoreactive signals along a cell-cell boundary (scale bar, 20 μ m). (E) Immunohistochemical staining of CLDN9 in the normal pituitary gland (scale bar, 200 μ m). The square indicates the enlarged areas presented in the right panels. mAb, monoclonal antibody; CMV, cytomegalovirus promoter; LMNB1, Lamin B1; RFP, red fluorescent protein; CLDN, claudin; EF1a, human elongation factor 1- α promoter.	A rat monoclonal antibody (mAb) was generated and characterized against human claudin-9 (CLDN9). The topology and amino acid sequences of human CLDN9 and related claudins were analyzed, with conserved amino acids indicated in red and the antigen region highlighted in yellow. (A) The specificity of the antibody was demonstrated through western blot and immunohistochemical analyses. (B-C) 293T cells transfected with individual CLDN expression vectors were subjected to these analyses, with a scale bar of 50 μ m. (D) Co-transfection of Ishikawa cells with CLDN9 and Lamin-RFP allowed for the localization of CLDN9 along cell-cell boundaries, as indicated by arrowheads (scale bar, 20 μ m). (E) Immunohistochemical staining of normal pituitary gland tissue revealed endogenous CLDN9 expression (scale bar, 200 μ m). The square indicates the enlarged areas shown in the right panels. mAb was produced using the cytomegalovirus (CMV) promoter, and Lamin B1 (LMNB1) and red fluorescent protein (RFP) were utilized as controls. CLDN, claudin; EF1a, human elongation factor 1- α promoter.	Yes, panel B has information about the western blot where in the language rewrite it shows the information to be related to panel A.
Post-radiation AVL - lymphatic endothelial phenotype manifesting with PROX1 expression. No MYC gene amplification/overexpression. bstpath dermpath	Post-radiation AVL, demonstrating lymphatic endothelial differentiation, is characterized by the presence of PROX1 expression. MYC gene amplification and overexpression are absent.	None
thought you would love these robot assisted bronchoscopy cryobiopsies of inflammatory looking nodules in RLL using 1.1 mini cryoprobe. Organizing pneumonia with budding yeast fungi pulmpath ip MedTwitter Biopsy credit: photo cred: Daniel Shepherd	I recently came across these bronchoscopic cryobiopsies of inflammatory-looking nodules in the right lower lobe (RLL) performed using robot-assisted technology and a 1.1 mm cryoprobe. The findings are suggestive of organizing pneumonia with possible involvement of budding yeast fungi. Image credit: Daniel Shepherd, pulmonary pathologist. # MedTwitter # pulpath	None
Proliferation of bowel duct and formation of papillary projection.	The intestinal glands display excessive growth and the development of papillary projections.	None, original caption likely outputted bowel duct instead of bile duct due to error is speech to text technology. Hence the generated rewrites says intestinal, based on the word 'bowel'.

Table 1. Manual evaluation results for hallucinations in language rewrites. The first column shows the original captions, the second column presents the Mistral rewrites, and the third column provides the manual evaluation of hallucinations, categorized as: None, Medically Accurate Additional Information, and Yes (hallucinations present). Detailed explanations for non-trivial assessments are included.

Original Caption	Mistral Rewrite	Hallucination
PITFALL ALERT ! Not every case with CD34 and Stat6 positive will be a Solitary fibrous tumor! Recurrent back tumor. Final Dx: Dedifferentiated Liposarcomas (With a Solitary Fibrous Tumor-like Morphology) Bstpath pathology	Beware of pitfalls: Solitary fibrous tumors are not the only entities that exhibiting CD34 and STAT6 positivity. In fact, dedifferentiated liposarcomas, which may present with a Solitary Fibrous Tumor-like morphology, should also be considered in the differential diagnosis.	None
The histologically classical smooth muscle in proximity to a hair follicle is likely an arrector pili muscle.	An arrector pili muscle is the smooth muscle fibers situated around a hair follicle, responsible for piloerection.	Medically accurate additional information is present: piloerection.
Distinguishing infection from GPA can be difficult based on symptoms alone.	Clinically, differentiating Granulomatosis with Polyangiitis (GPA) from infection may pose a diagnostic challenge. In summary, distinguishing granulomatosis with polyangiitis (GPA) from an infection based on symptoms alone can be a diagnostic dilemma.	None
Diagnosis of Kaposi sarcoma, which is characterized by poorly formed vessels and spindling and growing out of endothelial cells.	Kaposi sarcoma is a multicentric tumor with abnormal proliferation of endothelial cells, marked by the formation of irregular and disorganized blood vessels.	Medically accurate additional information is present: multi centric.
Blood flowing towards the central vein in the liver.	Blood is directed towards the hepatic central vein within the liver.	None
Difficulty in distinguishing between spindle cell lesions, with schwannoma being the most distinctive.	Schwannomas are typically more distinct from other spindle cell lesions due to their characteristic features such as Antoni A and B patterns and Verocay bodies.	Medically accurate additional information is present: Antoni A and B patterns and Verocay bodies are related to shwannomas.
The presence of eosinophils can help exclude a diagnosis of vitreous drug reaction.	In instances where eosinophils are identified in the vitreous, a drug reaction should be considered less likely.	None
The epithelium being discussed is a pseudostratified columnar ciliated epithelium with goblet cells.	A pseudostratified columnar epithelium with cilia and goblet cells is the type under consideration.	None
Absence of mucous glands in the submucosa of the esophageal mucosa. The muscularis externa in the lower esophagus consists of inner circular and outer longitudinal smooth muscle layers.	In the lower esophagus, there is a lack of mucous glands within the submucosa, while the muscularis externa is composed of an inner circular and an outer longitudinal layer of smooth muscles.	None
Whenever you have a biopsy from an immunocompromised patient, look carefully. For instance, there's more than just GVHD in this colon biopsy ... there's a cryptosporidium festa! pathology gipath	Immunocompromised patients carry an increased risk for various infections, and a colon biopsy from such a patient should be meticulously examined, as evidenced by the presence of Cryptosporidium in this particular case.	None
Immunohistochemistry (Formalin/PFA-fixed paraffin-embedded sections) - Anti-XRCC1 antibody (ab264115)	Immunostaining of formalin-fixed, paraffin-embedded tissue sections can be performed using an antibody against XRCC1 (ab264115) for detection of this repair protein.	None, slight loss of meaning.

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The lesion has a basal cell look and horn cyst, suggesting a basal cell papilloma or seborrheic keratosis.	The lesion displays features of a basal cell papilloma or seborrheic keratosis, including basaloid cells and a horned or verrucous appearance.	Yes, verrucous.
Apoptosis evaluated in mucosa and colon cancer by TUNEL staining.	Apoptosis was assessed in both the mucosa and cancerous tissue of the colon using TUNEL staining.	None
10 basic soft tissue pathology cases with discussion. Video: Thx to my resident Dr. Terrance Lynn for helping me make this video! pathology pathologists PathTwitter BSTpath dermpath	I. In this educational video, we will explore ten common soft tissue pathology cases, supported by valuable insights from Dr. Terrance Lynn, my dedicated resident. II. Dr. Terrance Lynn and I collaborated to create this informative video on ten fundamental soft tissue pathology cases.	None
Punch biopsy shows a similar interface reaction pattern on scanning.	Scanning the punch biopsy reveals a consistent interface reaction pattern.	None
Comparison of the results obtained using the specialized color classifier and embedded classifier.	The outcomes yielded from the advanced color classifier and inbuilt classifier will be compared.	None
Trichoblastoma is a subtype of trichilemmal with less differentiation towards follicular structures and no necrosis.	Trichoblastoma is a benign epidermal tumor that arises from the outer root sheath of a hair follicle with minimal follicular differentiation and absence of necrosis. It's a subtype of trichilemmal tumors.	Medically accurate additional information is present: Trichoblastoma is defined as a benign epidermal tumor.
Multiple lesions in the cerebellum causing altered mental status.	Multiple lesions in the cerebellum can result in various neurological symptoms, including impaired coordination, balance, and altered mental status.	Medically accurate additional information is present: Additional symptoms such as impaired coordination and balance.
(a) Facial Kaposi sarcoma (KS) in an adult man undergoing treatment for pulmonary tuberculosis. A noncaseating granuloma is present within the KS lesion in the lower half of the field (arrow). (b) Detail of the vasoformative KS proliferation. (c) Higher magnification of the tuberculous granuloma. Although acid-fast bacilli could not be demonstrated on Ziehl-Neelsen staining, mycobacterial DNA was detected by PCR. (d) CD31 immunostain highlighting the background KS. (e) The KS lesional cells were also immunoreactive for HHV-8.	(a) In an adult man receiving tuberculosis treatment, a Kaposi sarcoma (KS) lesion manifested on the face, with a noncaseating granuloma identified in the lower half (indicated by arrow). The KS exhibited characteristic vascular proliferation. (b) Detailed view of the KS lesional growth. (c) A higher magnification image reveals the granuloma. Although acid-fast bacilli were not detected using Ziehl-Neelsen staining, mycobacterial DNA was discerned via polymerase chain reaction (PCR). (d) CD31 immunohistochemistry stained the background tissue of KS lesions. (e) Immunoreactivity for human herpesvirus-8 (HHV-8) was present in the KS lesional cells.	Yes, vasoformative KS proliferation in panel B is rewritten for panel A as KS exhibited characteristic vascular proliferation.
Discussion of differentiating points in cartilage, including the upper part of the epithelium and the amount of cells in the isogynous group.	In cartilage diagnosis, consider the characteristics of the superficial epithelial layer and the composition of the isogenous cell group.	None

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Cells in neurothekeoma arrange in cords and strands with collagen bundles between them.	In neurothekeomas, the neoplastic cells form cords and strands separated by collagen bundles.	Medically accurate additional information is present: Neurothekeomas are benign tumors, neoplastic cells can be present so its medically accurate.
Description of ductal cells in the pancreas with round to slightly oval nuclei and a pale eosinophilic cytoplasm.	The pancreatic ductal cells display round to oval nuclei and have a pale, eosinophilic cytoplasmic appearance.	None
The oocyte with its nucleus is visible.	An oocyte, or mature egg cell, can be observed with its distinct nucleus present.	None
The pancreas is a classical exocrine gland but also an endocrine gland.	The pancreas is a multifunctional organ capable of producing both digestive enzymes and hormones.	None
Erythema multiforme or TEN can cause total 100% necrosis of the epidermis.	Both erythema multiforme and toxic epidermal necrolysis are conditions that can result in the complete loss of the epidermis, causing a loss of 100% of the epidermal tissue.	None
Pleural fluid specimen from patient with an effusion. How would you categorize the findings? cytology cytopath	Classification of the cytological findings in a pleural fluid specimen from a patient with an effusion is crucial for diagnosis and treatment.	Yes, loss of meaning since the original caption is a question.
Presence of active inflammation in the deep pits, which is most commonly caused by Helicobacter pylori gastritis.	Active inflammation in the gastric pits is predominantly linked to Helicobacter pylori infections.	None
Presence of calcification and pink hyaline material, which is keratin.	Calcifications and pink hyaline material suggest the presence of degenerative changes or keratin debris.	Yes, the word debris is added which might slightly alter the meaning.
Description of a type of polyp that is typically more common in the stomach and small bowel.	A type of polyp that is frequently encountered in the stomach and small intestine is described here.	None
MICA and MICB expression of MCC tumors in situ. MCC tumor samples from 34 patients were analyzed by immunohistochemistry for expression of MICA and MICB. (a) Samples were classified as positive or negative. Representative negative and positive samples are depicted at 40x magnification, scale bars are 100µm. The positive examples represent the strongest obtained signal with the respective antibody. (b) Tumor samples were stratified into 4 groups: Double positive for MICA and MICB (+/+, 14%, n=7), only positive for MICA (+/-, 20%, n=10), only positive for MICB (-/+, 12%, n=6), or double negative (-/-, 54%, n=27).	The expression of MICA and MICB proteins was assessed in MCC tumor samples from 34 patients through immunohistochemical analysis. Based on the results, the samples were categorized into four groups: those expressing both MICA and MICB (20% or 7 out of 34 cases), those expressing only MICA (35% or 12 out of 34 cases), those expressing only MICB (21% or 7 out of 34 cases), and those that did not express either MICA or MICB (44% or 15 out of 34 cases). Representative images of negative and positive expressions are depicted at a magnification of 40x, with a scale bar of 100 µm representing each image. The strongest signals of MICA and MICB expression were used as examples.	Yes, false percentages are present.

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10th PediPath NCH_COTW: Stomach biopsy, teenager with abdominal pain. What is your diagnosis? NCHpath GIpath	For the PediPath case series, what is the diagnosis based on the teenager's stomach biopsy findings? NCHpath, Gastrointestinal pathology.	None
Drug reaction can present many faces. Eosinophilic pustular folliculitis induced by allopurinol australas j dermatol 2006;47(4):270-3 pathology dermpath dermatology dermatopathology dermatologia patologa pathclues patologia dermatologia	Allopurinol, an anti-gout medication, can lead to a range of cutaneous reactions, one of which is eosinophilic pustular folliculitis, as outlined in this 2006 study in the Australasian Journal of Dermatology.	Medically accurate additional information is present: The description of Allopurinol's use case.
Time for another PathTwitter case! A 17 yo patient complains of having unilateral decrease of visual acuity for one month. No nausea/vomiting, headache, photophobia or pain with eye movement. MRI and path are shown. Any thoughts & suggested workup? neuropath Ophthotwitter	A 17-year-old patient presents with a one-month history of decreased visual acuity in one eye. They report no accompanying symptoms such as nausea, vomiting, headache, photophobia, or eye pain during movement. Please find attached MRI and histopathology images for your evaluation and suggested diagnostic approach.# PathTwitter # Neuropath # Ophthotwitter	None
There is no active inflammatory process at this time.	Currently, there are no signs of inflammation present in the tissue.	None
Psoriasis with hyperplasia and ballooning degeneration is present.	In psoriasis, lesions may exhibit hyperplasia and ballooning degeneration leading to the characteristic psoriatic plaque.	Yes, meaning is slightly altered by the use of 'may exhibit'.
A, CT scan showing dilated appendix with nonspecific periappendiceal inflammatory changes (white arrow). B, 200x H&E stain of appendix tissue revealing large atypical mononucleated cells. C. 200x CD20 stain of appendix tissue. D, PET-CT at diagnosis revealing no evidence of hypermetabolism outside of the appendix	Image A shows a CT scan with a dilated appendix and periappendicular inflammatory changes. Image B displays a 200x magnification of H&E-stained appendix tissue, featuring large atypical mononuclear cells. Image C represents the same tissue type under 200x magnification using a CD20 stain. Image D depicts a PET-CT scan taken at diagnosis, which fails to exhibit any signs of hypermetabolism beyond the appendix.	None
Young adult with a skin lesion on the foot (1st two images), with lymph node mets (3rd image)CD31, CD34 and ERG (4th image) are positive. CAMTA-1 is negative.What is your diagnosis?pathtwitter BSTpath	Based on the presented images, a diagnosis of Kaposi sarcoma with negative CAMTA-1 staining is suggested in this young adult patient. However, additional clinicopathologic correlation, including the patient's clinical presentation and history, is essential for a definitive diagnosis.	Yes, omitting of some information and the latter sentence asking for additional clinicopathologic correlation
Highly cellular area with hyperchromatic nuclei and pleomorphism, suggestive of high-grade sarcoma.	The presence of highly cellular areas, hyperchromatic nuclei, and pleomorphism points towards a high-grade sarcoma.	None
Presence of large trophoblastic cells, intermediate trophoblast, syncytiotrophoblast, and cytotrophoblast elements suggest choriocarcinoma.	The presence of large, intermediate, and both syncytiotrophoblast and cytotrophoblast elements in the tissue sample is indicative of choriocarcinoma.	Yes, omitting of some information such as large trophoblastic cells leads to loss of meaning.

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This PAS stain was certainly more revealing than I had expected Artpath dermpath	The PAS stain unexpectedly provided insightful information, as demonstrated here. (Artpath, dermatopathology)	None
Ilium has more lymphoid tissue in the submucosa referred to as Peyer's patches.	The ilium contains a significant amount of lymphoid tissue named Peyer's patches found in the submucosa.	None
Invasive neoplasia can be diagnosed based on morphology alone.	The diagnosis of invasive neoplasia can often be made through careful evaluation of its histological features.	None
Carcinoma in situ, H&E stain, x200	At low power, the slide demonstrates an infiltrative growth pattern of carcinoma cells without stromal invasion, as shown by the H&E stain at x200 magnification.	Yes, additional information which can not be inferred from the text.
Description of cirrhosis with fibrosis around portal areas and nodules.	Cirrhosis is a progressive condition characterized by hepatic fibrosis, mostly in the periportal regions, and the formation of regenerative nodules.	Medically accurate additional information is present: cirrhosis definition is provided.
Our new favorite antibody is now the centre of breastpath talk: PDL1 Dr. Federico Rojo is one of the more experienced Pathologist on its evaluationSEAP2019G	At the SEAP2019G conference, Dr. Federico Rojo, known for his expertise in breast pathology, is generating considerable discussion about the latest favored antibody in the field: PDL1.	None
Thanks all for answer! I signed it as suspicious for K (C4) and I suggested to perform a biopsy. Here for you the pure squamous H&E Pathology BreastPath PathTwitterA cytopath case to brighten your day! 60yF, Breast FNA of a 10mm nodule, how would you sign it? PathTwitter stay tuned for H&E!	In response to your inquiry, I would characterize this breast fine needle aspiration as suspicious for malignancy, specifically a squamous cell process, warranting a confirmatory biopsy for a definitive diagnosis. (Age: 60yF) # BreastPath # PathTwitter # Cytopathology # H&E # StayTuned	None
Mucinous carcinoma is a type of adenocarcinoma that can develop from a mucinous tumor in the salivary gland.	Salivary gland mucinous carcinoma is a type of adenocarcinoma that displays the production and accumulation of mucin.	Medically accurate additional information is present: Accumulation of mucin is present in salivary gland mucinous carcinoma.
Additional immunosteochemistries are needed to consider the various possibilities for the tumor.	Further immunohistochemical studies are necessary for a more comprehensive diagnosis of the tumor.	None
Necrotic debris and foamy histiocytes were found.	Histiocytes contained lipid-laden vacuoles, suggestive of foam cells in the presence of necrotic tissue.	Yes, lipid-laden vacuoles are not mentioned in the original sentence.
Day 116: when you think youre looking at a testicular yolk sac tumor but it turns out it was a mesothelioma in the testis. GUpath pathology shook	It can be a challenging experience when initially evaluating a testicular mass as a yolk sac tumor, only to later discover it was actually a mesothelioma. Such a finding would certainly be a surprise for any urogenital pathologist.	None

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Mycobacteria can be identified using Thiel-Ziehl-Neelsen stain or Fite stain, but cultures and PCR may also be necessary.	Mycobacterial infections can be detected using Thiel-Ziehl-Neelsen stain or Fite stain, but diagnosis may require both microbiological culture and polymerase chain reaction (PCR).	None
Presence of dilated and ectatic blood vessels in the lamina propria.	In the lamina propria, there are prominent and enlarged blood vessels.	None
Refractory Coeliac disease RCD M. Calaminici hemePath GIPath ECPNice2019 ECPNice2019	Celiac disease (CD) refractory to a gluten-free diet presents with continued intestinal damage and chronic inflammation. The diagnostic criteria for refractory CD (RCD) can be found in the ECPNice2019 guidelines. M. Calaminici's hematopathology and gastrointestinal pathology teams share insights on this topic at hemePath and GIPath conferences.	Yes, although there isn't a medically inaccurate claim in this sentence, likely the ECPNice2019 is a conference where M. Calaminici presented. So diagnostic criteria would not be found in conference guidelines.
Necrosis and purple degeneration of fat within the fat, identified as fat saponification.	Lipid-laden macrophages and lipid vacuoles in fat tissue signify fat necrosis or saponification.	Yes, lipid-laden macrophages and lipid vacuoles are not mentioned.
Negative pertinent immunostains are important to check for location associated renal cell carcinoma or metastatic tumor.	Immunohistochemically negative findings, particularly in the context of renal tumors, necessitate further investigation to exclude a primary renal cell carcinoma or metastasis.	None
The epithelium is non-keratinized because nuclei are present in even the superficial layers.	The superficial layers of the epithelium contain nuclei, indicative of non-keratinized status.	None
When determining malignancy, nuclear pleomorphism (varying sizes and shapes of nuclei), nuclear to cytoplasmic ratio, nuclear hyperchromatism (increased hematoxylin pigment in the nucleus), and frequent mitotic figures are all concerning features.	When considering the potential for malignancy, variability in nuclear size and shape, an elevated nuclear-to-cytoplasmic ratio, and increased hematoxylin staining within cellular nuclei are all noteworthy findings that may raise suspicion. Additionally, the presence of numerous mitotic figures further supports the possibility of malignancy.	None
CD34 can help differentiate normal and abnormal neurons.	CD34, a common hematopoietic marker, plays no role in neural differentiation. However, it may be helpful in distinguishing normal neural tissue from neoplastic or reactive changes.	Yes, CD34 although not established clearly may play a role in neural differentiation.
High-grade lesion requires obliterative therapy to salvage patient's good prognosis.	Aggressive intervention is necessary for high-grade lesions to improve patient outcomes. Or, the high-grade lesion necessitates obliterative therapy to preserve a favorable patient prognosis.	None
The histological appearance of the tumor suggests it is benign, but its specific diagnosis is unclear.	The morphology of the tumor is indicative of a benign process, however, a definitive diagnosis remains elusive.	None
Small, cream-colored polyp seen in the gastric corpus of a 63 y/o M. pathology GIPath gastrixanthoma	A 63-year-old male underwent endoscopy revealing a small, cream-colored polyp located in the gastric body. The pathology report suggests a possible gastric xanthoma.	Medically accurate additional information is present: gastric sample is acquired via endoscopy.

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Original Caption	Mistral Rewrite	Hallucination
Trickly spindle cells in the dermis with any sign of hemorrhage can be indicative of Kaposi sarcoma, which can occur in various settings including old people on the feet (classic form of Kaposi).	Spindle cells with scarce hemorrhage in the dermis can raise suspicion for Kaposi sarcoma, particularly in older individuals, most commonly manifesting on the feet (classic form).	None
E2F2 and PPAR- γ protein expression in nonkeratinizing nasopharyngeal carcinoma (NPC) and nasopharyngitis (NPG) tissues. Immunohistochemistry was performed to detect E2F2 and PPAR- γ protein expression in nonkeratinizing NPC tissues (a, b) and NPG tissues (c, d). Scale bar, 50 μ m (e, f). The immunohistochemistry data were analyzed semiquantitatively to determine the E2F2 and PPAR- γ expression levels in nonkeratinizing NPC and NPG tissues. Data are shown as means \pm standard deviations. $P < 0.01$.	Immunohistochemical examination was conducted on nonkeratinizing nasopharyngeal carcinoma (NPC) (Figure a and b) and nasopharyngitis (NPG) (Figure c and d) tissues to evaluate the protein expression of E2F2 and PPAR- γ . E2F2 and PPAR- γ protein expression levels in NPC and NPG were calculated semi-quantitatively. The mean expression levels, along with their standard deviations, are presented in the graph with statistically significant difference marked ($P < 0.01$).	None
The tumor shows immunoreactivity for HMB45 and melan A, and is categorized as a PEComa-like lesion or tumor.	This neoplasm exhibits positive immunostaining for HMB45 and melan A proteins, thus being classified as a PEComa-like tumor.	None
The speaker is discussing the importance of strategically sampling the capsule and tissue to avoid missing follicular carcinoma.	In order to accurately diagnose follicular carcinoma, it is essential to carefully and strategically examine both the capsule and underlying tissue during a thyroid fine needle aspiration procedure.	Medically accurate additional information is present: follicular carcinoma is a type of thyroid cancer.
The tissue appears different from normal parotid and may not be a dilated duct. Differential diagnosis includes a cystic lesion with zymogen-positive acinar cells.	Based on the microscopic features, this lesion may not represent a typical salivary gland tissue. Possible alternate diagnoses include cystic lesions, some of which can contain zymogen-expressing acinar cells.	None
Comparison of CD4 and CD7 expression shows a decrease in CD7 expression.	The ratio of CD7 to CD4 expression is reduced in this population.	None
The cervix undergoes a dramatic change during birth due to the hormone relaxin.	During childbirth, the hormone relaxin causes significant relaxation of the cervix to facilitate the passage of the fetus.	Medically accurate additional information is present: mention regarding the passage of fetus.
Chondroblasts secrete and chondrocytes maintain the matrix.	Chondroblasts are responsible for matrix synthesis during cartilage development, while mature chondrocytes maintain the extracellular matrix in mature cartilaginous tissue.	Medically accurate additional information is present: cartilage is mentioned.
The tumor is more mitotically active than melanomas.	This tumor exhibits a greater degree of cellular proliferation than the average melanoma.	None

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2ndary AML dermpath hemepath tuesdaythoughts tuesdaymotivation tuesdayvibes tuesdayTB	The diagnosis of secondary acute myeloid leukemia (AML) may be suggested by findings in both bone marrow (hemepathology) and skin (dermatopathology) samples.	Medically accurate additional information is present: The hashtags for dermpath and hemepath are resulting the mention of skin and bone marrow. AML occurs in bone marrow and can cause a rash called leukemia cutis in the skin.
MMR IHC in endometrial cancer: PMS2 loss only not uncommon -Dr Longacre CBCII gynpath	MMR (mismatch repair) protein, specifically PMS2, loss occurs relatively frequently in endometrial cancers.	None
Presence of sebaceous glands in the dermis and downward extension of the rete ridges may indicate nevus sebaceous.	The presence of sebaceous glands within the dermis and the downward extension of rete ridges are suggestive features for the diagnosis of a nevus sebaceous.	None, the rete ridges are probably mis-translated by the speech to text model as 'reed' ridges. The LLM corrected this typo and wrote 'rete' ridges.
This EyePath case is an orbit biopsy and a fairly common entity. But there's one difference from other sites... Let me know if you'd like annotations.	Orbit biopsies can involve various benign and malignant conditions, but this particular case presents a unique feature from typical diagnoses. Please let me know if you require further annotations.	None
Possible increase in reactive glial cells in the brain tissue	Reactivity of glial cells, particularly astrocytes, is frequently observed in a number of neurodegenerative processes.	Medically accurate additional information is present: astrocytes are glial cells and glial cell reactivity is caused in the presence of a disease or trauma, hence the mention of neurodegenerative processes.
Possible diagnosis of botryomycosis based on observation of a small organism.	Based on the observation of a small organism, botryomycosis is a potential diagnosis to consider.	None
Bx of ulcerative lesion on lingual gingiva RMT, pt in 80s. p60,CK5/6,vimentin+, CEA/S100/SMMHC/ABlue2.5 -. Can this be acantholytic SCC? DDx: MEC, myoepithelial lineage carcinoma. Opinions appreciated. Oralpath ENTpath 1/2	In a biopsy of an ulcerative lesion on the lingual gingiva of a patient in their 80s, immunohistochemical stains showed positivity for p60, CK5/6, vimentin, and negativity for CEA, S100, SMMHC, and ABL2.5. Can this represent an acantholytic squamous cell carcinoma? Differential diagnosis should also consider mucosal epithelial carcinoma (MEC) arising from myoepithelial lineage cells. Opinions are welcome. (Oralpath, ENTpath)	None, additionally abbreviations are written in their full form.
Lichenoid and perivascular dermatitis can be seen in psoriasis and syphilis.	Both psoriasis and syphilis may present with lichenoid and perivascular dermatitis.	None

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Positive immunohistochemistry results (× 200) for calretinin (A) and synaptophysin (B).	The presence of calretinin (A) and synaptophysin (B) was confirmed through immunohistochemical staining, at a magnification of × 200.	None
F&A of a swelling on the ventral neck of a ten-year-old dog.	Fine-needle aspiration (FNA) was performed on a neck mass in a ten-year-old canine.	None, LLM corrected a potential typo with FNA which was written as F&A in the original caption.
Synovial sarcoma, biphasic -Highly cellular, dark blue spindle cell areas: a good low-power clue.Epithelial component with more abundant eosinophilic cytoplasm and small, prominent nucleoli. Cytologically monotonous.BSTPath cytopath cytohistocorrelation PathTwitter	Synovial sarcoma, biphasic, presents with spindle cell areas having high cellularity, dark blue hue, and epithelioid components with more abundant eosinophilic cytoplasm and prominent nucleoli. The epithelial component can appear cytologically monotonous.	None
The appendix may have inflammatory cells normally, so inflammation should be interpreted with caution.	Normal appendicular infiltration by inflammatory cells may exist, so an inflammatory appendectomy specimen should be evaluated with caution.	None
Papillary cystadenofibroma of the peritubular tissues is the likely diagnosis.	Based on the findings, a diagnosis of papillary cystadenofibroma of the peritubular tissues is the most probable explanation.	None
Postmortem analysis. a Cerebral metastasis seen at the subarachnoid space (hematoxylin and eosin stain, original magnification ×100). b Higher-magnification view the metastatic cells, which show marked pleomorphism, hyperchromasia, and atypia (hematoxylin and eosin stain, ×200)	a. During postmortem examination, a cerebral metastasis was identified in the subarachnoid space, as demonstrated by hematoxylin and eosin stain at a magnification of 100x. b. Upon closer inspection at a higher magnification of 200x, the metastatic cells exhibited marked pleomorphism, hyperchromasia, and atypia, as observed in the hematoxylin and eosin-stained tissue.	None
The snap-apart technique is a poor way to prepare FNA biopsies (especially thyroid like this one). Tissue fragments stay clumped and too thick to evaluate. NotAFan Smears or even liquid based preps are preferable...cytopath cytology ENTpath FNA recycledtweet	The “snap-apart” technique may produce sub-optimal results when preparing fine needle aspirate (FNA) biopsies, particularly in the case of thyroid tissue, as the specimen fragments often remain clumped and too thick to adequately evaluate. Alternatively, using smear preparations or even liquid-based preparations for cytopathology is generally preferred for improved diagnostic yield.	None
The presence of myelin sheath inside the axon indicates that these are myelinated axons.	Myelinated axons are characterized by the presence of a myelin sheath covering their outer surface.	None, myelin sheath wraps around the axon. The original sentence has a slight mistake by saying myelin sheath inside the axon.
Endometrial stromal sarcoma with smooth muscle differentiation and a unique pattern of trabecular or sex chord-like growth pattern.	Endometrial stromal sarcoma with smooth muscle differentiation is characterized by a unique pattern of growth, which may resemble a trabecular or sex cord-like appearance.	None, sex ‘chord’ in the original caption is corrected as sex ‘cord’.

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sale on 2-for-1 GUpath specials:radical nephrectomy with clear cell RCC+papillary adenoma	Two-for-one offer on GUpath specials: radical nephrectomy for clear cell RCC accompanied by the identification of an incidental papillary adenoma.	None
Discussion of a skin lesion with hair follicle, sebaceous glands, and sun damage.	Let us discuss the features of a skin lesion manifesting hair follicles, sebaceous glands, and solar damage.	None
Features visible at low magnification include hyperkeratosis, follicular plugging, and dense infiltrate of lymphocytes.	At low magnification, the notable features include marked hyperkeratosis, numerous follicular plugs, and a dense accumulation of lymphocytes.	None
Immunohistochemical analysis of four prognostically relevant T cell proliferation-related regulatory factors (A: AHCY; B: AHNAK; C: CXCL12; D: HOMER1).	Four potential prognostic markers related to T cell proliferation (A: Adenosine hydroxylase; B: AHNAK; C: CXCL12, a chemokine; D: HOMER1) were examined through immunohistochemical analysis.	Yes, AHCY stands for S-adenosylhomocysteine hydrolase.
The presence of collagen trapping between lipocytes is classic for DFSP.	Dermatofibrosarcoma protuberans (DFSP) is characterized by the deposition of collagen within lipocytes, known as collagen trapping.	None, abbreviated disease is written in it's full form.
Description of elastic fibers within the wall of a blood vessel that expand and recoil during heart contractions.	Elastic fibers in the arterial wall facilitate the vessel's ability to expand and contract with the heart's pulsations.	None
Thick vessels observed in the region.	Prominent or hypertrophic vessels are apparent in this area.	None
here's a recent HAMN case I had assistance on this GIpath appendiceal mucinous neoplasm case, basically looks like non-ruptured non-invasive LAMN, but with areas of high grade dysplasia...HAMN??saw this similar post	In a recent appendiceal mucinous neoplasm case, I provided assistance and the histology findings included features consistent with low-grade appendiceal mucinous neoplasm. However, there were areas exhibiting high-grade dysplasia. Remarkably, there was a similar case reported on HAMN.	None
The second patient had mycosis fungoides, with atypical cells and epidermal involvement that had been misdiagnosed for a long time as primary cutaneous follicle center lymphoma and spongiosis.	The histological features of the second patient's biopsy were consistent with mycosis fungoides, a type of T-cell lymphoma. However, the diagnosis was initially missed, as the epidermotropism and atypical cells were mistakenly thought to represent primary cutaneous follicle center lymphoma and spongiosis.	Medically accurate additional information is present: mycosis fungoides (MF) is a type of T-cell lymphoma and epidermotropism is the migration of lymphocytes into the epidermis. Even though the original sentence doesn't explicitly mention lymphocytes, it mentions epidermal involvement. Since epidermotropism is highly associated with MF, this information is inferable from the sentence.

C. Methods

C.1. Detailed Information on Test Datasets

Table 2. Class names and distributions across different datasets used for zero-shot classification.

	Class Distribution
BACH	Breast Non-Malignant Benign Tissue: 100, Breast Malignant In-Situ Carcinoma: 100, Breast Malignant Invasive Carcinoma: 100, Normal Breast Tissue: 100, Total: 400
LC Lung	Lung Adenocarcinoma: 5000, Benign Lung: 5000, Lung Squamous Cell Carcinoma: 5000, Total: 15000
LC Colon	Colon Adenocarcinoma: 5000, Benign Colonic Tissue: 5000, Total: 10000
MHIST	Hyperplastic Polyp: 2162, Sessile Serrated Adenoma: 990, Total: 3152
Renal cell	Red Blood Cells: 996, Renal Cancer: 13057, Normal Renal Tissue: 8652, Torn Adipose Necrotic Tissue: 8522, Muscle Fibrous Stroma Blood Vessels: 5460, Total: 36687
Skin cancer	Necrosis: 3038, Skeletal Muscle: 7732, Eccrine Sweat Glands: 3571, Vessels: 1643, Elastosis: 208, Chondral Tissue: 7177, Hair Follicle: 2012, Epidermis: 14118, Nerves: 1884, Subcutis: 12053, Dermis: 22610, Sebaceous Glands: 10907, Squamous-Cell Carcinoma: 11182, Melanoma In-Situ: 11682, Basal-Cell Carcinoma: 8923, Naevus: 10629, Total: 129369
Skin tumor	Squamous-Cell Carcinoma: 11182, Melanoma In-Situ: 11682, Basal-Cell Carcinoma: 8923, Naevus: 10629, Total: 42416
CRC	Adipose: 1338, Debris: 339, Lymphocytes: 634, Mucus: 1035, Smooth Muscle: 592, Normal Colon Mucosa: 741, Cancer-Associated Stroma: 421, Colorectal Adenocarcinoma Epithelium: 1233, Total: 6333
SICAP	Benign Glands: 644, Atrophic Dense Glands: 393, Cribriform Ill-Formed Fused Papillary Patterns: 853, Isolated Nest Cells Without Lumen Rosetting Patterns: 232, Total: 2122
Databiox	Well Differentiated Bloom Richardson Grade One: 43, Moderately Differentiated Bloom Richardson Grade Two: 63, Poorly Differentiated Grade Three: 49, Total: 155
Camelyon	Lymph Node: 16391, Lymph Node Containing Metastatic Tumor Tissue: 16377, Total: 32768
Pannuke Organ	Lung: 184, Breast: 2351, Thyroid: 226, Uterus: 186, Skin: 187, Esophagus: 424, Liver: 224, Testis: 196, Ovarian: 146, Kidney: 134, Prostate: 182, Stomach: 146, Adrenal Gland: 437, Bile Duct: 420, Cervix: 293, Headneck: 384, Bladder: 146, Pancreatic: 195, Colon: 1440, Total: 7901
Pannuke Cell	Neoplastic Cells: 681, Inflammatory Cells: 63, Connective Soft Tissue Cells: 735, Dead Cells: 3, Epithelial Cells: 171, Total: 1653
Ocelot Organ	Bladder: 135, Endometrium: 138, Head-And-Neck: 46, Kidney: 204, Prostate: 80, Stomach: 60, Total: 663
Ocelot Cell	Normal Cells: 182, Tumor Cells: 474, Total: 656

C.2. Linear Probing Experimental Setup

Logistic regression was implemented using the linear models module from the Sklearn package. The algorithm was configured with two random states (0 and 42), a maximum iteration limit of 1000, and an inverse regularization strength of 0.316. Four solvers were employed: ‘newton-cg’, ‘sag’, ‘saga’, and ‘lbfgs’. In total, eight models were trained, combining the four solvers with the two random states.

D. Results

D.1. Extended Zero-Shot Classification Results

The main paper presents the mean accuracy using bar charts, with standard deviation indicated by error bars. Additionally, Table 3 provides the standard deviation in numerical form.

Table 3. The table depicts the zero-shot classification accuracy of each dataset and model pairing, showing the mean and standard deviation of accuracies achieved with 2000 prompt sets. Highest mean amongst four models are highlighted in bold.

Mean (Std)	Clip	Quilt1M	SynthPath	SynthPath Context
Bach	0.26(0.04)	0.28(0.05)	0.33(0.06)	0.36(0.06)
Lc Lung	0.38(0.08)	0.48(0.13)	0.59(0.13)	0.63(0.13)
Lc Colon	0.58(0.09)	0.68(0.15)	0.76(0.14)	0.77(0.13)
Mhist	0.53(0.13)	0.64(0.07)	0.61(0.07)	0.49(0.11)
Renal Cell	0.26(0.06)	0.33(0.09)	0.35(0.11)	0.40(0.09)
Skin Tumor	0.09(0.03)	0.25(0.04)	0.31(0.06)	0.33(0.06)
Skin Tumor	0.26(0.03)	0.44(0.05)	0.5(0.05)	0.49(0.05)
Crc	0.2(0.05)	0.24(0.09)	0.37(0.08)	0.39(0.08)
Sicap	0.32(0.08)	0.34(0.08)	0.31(0.05)	0.33(0.04)
Databiox	0.33(0.06)	0.35(0.06)	0.35(0.07)	0.35(0.06)
Camelyon	0.55(0.04)	0.53(0.05)	0.56(0.06)	0.57(0.07)
Pannuke Organ	0.07(0.05)	0.12(0.07)	0.13(0.08)	0.16(0.08)
Pannuke Cell	0.32(0.16)	0.36(0.15)	0.43(0.13)	0.45(0.12)
Ocelot Organ	0.17(0.07)	0.3(0.09)	0.39(0.06)	0.42(0.06)
Ocelot Cell	0.58(0.17)	0.62(0.14)	0.59(0.1)	0.64(0.09)

D.2. Extended Results on Base Model Selection in Ablation Studies

Table 4 shows the mean and standard deviation of zero-shot classification accuracy for the SynthPath B-16 model. This analysis examines the effect of changing the base architecture from B-32 to B-16 to evaluate the impact of training the Quilt1M model with general language rewrites on a different architecture. The results indicate that the SynthPath B-16 model is the best-performing model, or ties with the best-performing model, in 10 out of 15 datasets. Additionally, an increase in mean accuracy is observed in 11 out

Table 4. Ablation study results demonstrating the impact of changing the base model from B-32 to B-16 for further training the Quilt1M model with general language rewrites. The zero-shot classification results are shown in mean and standard deviation format for Clip B-16, Quilt1M B-16 and SynthPath B-16 models.

Mean (Std)	Clip B-16	Quilt1M B-16	SynthPath B-16
Bach	0.25 (0.04)	0.33 (0.06)	0.38 (0.06)
Lc Lung	0.37 (0.08)	0.43 (0.11)	0.55 (0.12)
Lc Colon	0.59 (0.1)	0.63 (0.11)	0.66 (0.12)
Mhist	0.52 (0.11)	0.46 (0.11)	0.51 (0.11)
Renal Cell	0.32 (0.07)	0.28 (0.09)	0.33 (0.09)
Skin Tumor	0.11 (0.03)	0.17 (0.04)	0.22 (0.05)
Skin Tumor	0.26 (0.03)	0.35 (0.05)	0.37 (0.05)
Crc	0.23 (0.05)	0.16 (0.06)	0.2 (0.08)
Sicap	0.31 (0.08)	0.26 (0.08)	0.29 (0.07)
Databiox	0.33 (0.05)	0.34 (0.06)	0.34 (0.06)
Camelyon	0.55 (0.03)	0.56 (0.07)	0.56 (0.06)
Pannuke Organ	0.08 (0.06)	0.14 (0.07)	0.14 (0.07)
Pannuke Cell	0.45 (0.14)	0.33 (0.14)	0.41 (0.14)
Ocelot Organ	0.22 (0.07)	0.31 (0.08)	0.43 (0.06)
Ocelot Cell	0.62 (0.15)	0.64 (0.13)	0.63 (0.13)

of 15 datasets when transitioning from the Quilt1M B-16 model to the SynthPath B-16 model.

D.3. Retrospective Analysis of Top Performing Prompt Agreement Amongst Models

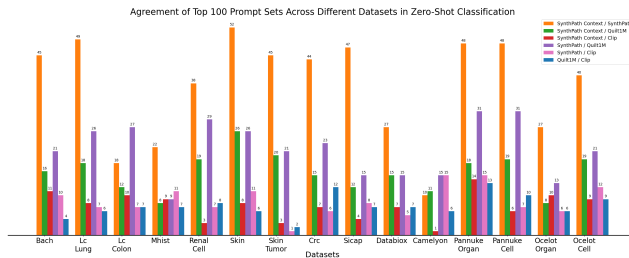


Figure 1. This figure illustrates the number of common prompt sets among the top 100 performing sets out of 2000 prompt sets used for zero-shot classification. It shows pairwise common sets between the following four models: Clip, Quilt1M, SynthPath, and SynthPath Context across all datasets.

Figure 1 illustrates the number of common prompt sets ranking among the top 100 for each pair. The highest agreement is generally observed between the SynthPath Context and SynthPath models, followed by the SynthPath and Quilt1M models. This close alignment is due to the SynthPath Context model training a single embedding layer on precomputed embeddings from the SynthPath model. Similarly, the SynthPath model closely aligns with the Quilt1M model because the language rewrites in SynthPath are generated from captions originating from Quilt1M.

The agreement between the SynthPath Context Model and the Quilt1M model is slightly less compared to SynthPath due to the two-stage training process from Quilt1M to SynthPath Context. The agreement percentages between the SynthPath Context, SynthPath, and Quilt1M models and the Clip model are the lowest, attributed to the Clip model not being trained on a pathology-specific dataset. This extensive analysis highlights the significant differences in prompt performance and emphasizes the importance of using diverse prompts when benchmarking and comparing models.