

Can GPT-4V(ision) Serve Medical Applications?

Case Studies on GPT-4V for Multimodal Medical Diagnosis

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Abstract

Driven by the large foundation models, the development of artificial intelligence has witnessed tremendous progress lately, leading to a surge of general interest from the public. In this study, we aim to assess the performance of OpenAI's newest model, GPT-4V(ision), specifically in the realm of **multimodal medical diagnosis**. Our evaluation encompasses **17** human body systems, including Central Nervous System, Head and Neck, Cardiac, Chest, Hematology, Hepatobiliary, Gastrointestinal, Urogenital, Gynecology, Obstetrics, Breast, Musculoskeletal, Spine, Vascular, Oncology, Trauma, Pediatrics, with images taken from **8** modalities used in daily clinic routine, *e.g.*, X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET), Digital Subtraction Angiography (DSA), Mammography, Ultrasound, and Pathology. We probe the GPT-4V's ability on multiple clinical tasks with or without patient history provided, including imaging modality and anatomy recognition, disease diagnosis, report generation, disease localisation.

Our observation shows that, while GPT-4V demonstrates proficiency in distinguishing between medical image modalities and anatomy, it faces significant challenges in disease diagnosis and generating comprehensive reports. These findings underscore that while large multimodal models have made significant advancements in computer vision and natural language processing, it remains far from being used to effectively support real-world medical applications and clinical decision-making.

All images used in this report can be found in https://github.com/chaoyi-wu/GPT-4V_Medical_Evaluation.

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1 Introduction

Large language models (LLMs), particularly the GPT series developed by OpenAI, have demonstrated remarkable capabilities across a wide spectrum of domains, even in specialized fields such as medicine and law [20, 3, 19, 9]. While prior models in the GPT series have demonstrated potential in medical related language tasks [17, 21, 8], even achieving high performance in the United States Medical Licensing Examination (USMLE), they are fundamentally limited in daily clinical routine, due to its inability to read visual signals. Inspired by this, in medical community, many visual or multimodal foundation models [12] are also emerging, *e.g.*, for fundus [27], pathology [10], radiology [23] or general medical images [26, 22, 13].

Since September, the latest version, GPT-4V [24], starts to support multimodal input, sparking curiosity about its effectiveness from the moment it became available for use. In this report, we aim to initiate a study on the capabilities of GPT-4V for multimodal medical diagnosis, by asking the question: **“Can GPT-4V serve medical applications?”** This is a question of paramount importance, not only for the AI community, but also for clinicians, patients, and healthcare administrators.

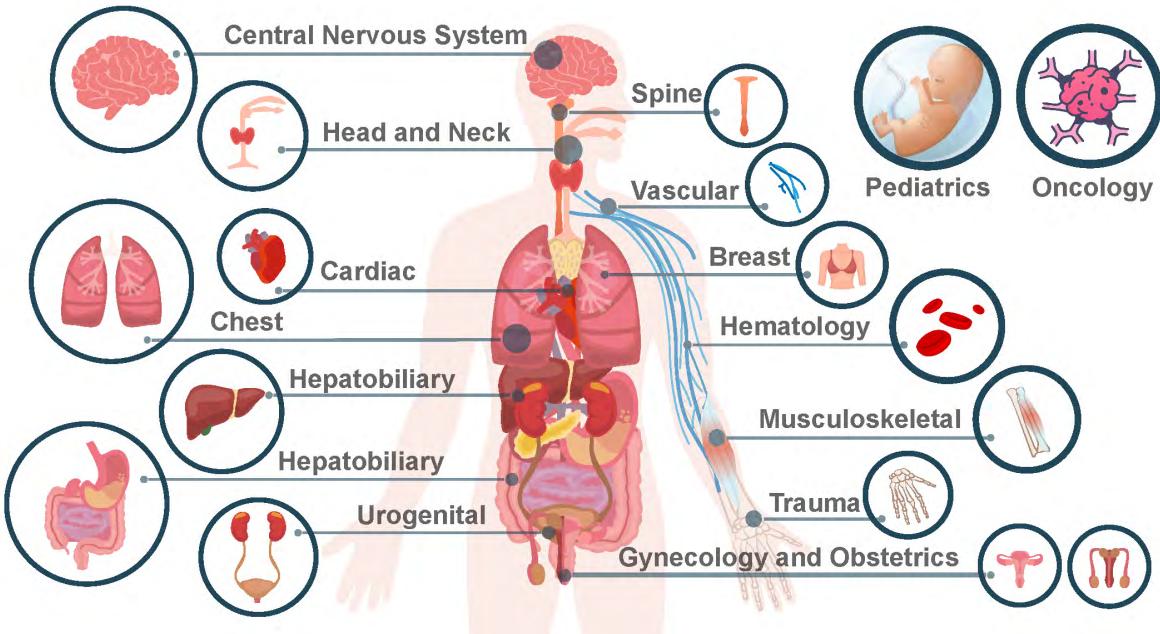
1.1 Motivation.

In this report, our goal is to initiate a systematic evaluation of the capabilities of GPT-4V on multimodal medical diagnosis. Specifically, we perform the case-level study from **17** human body systems, including Central Nervous System, Head and Neck, Cardiac, Chest, Hematology, Hepatobiliary, Gastrointestinal, Urogenital, Gynecology, Obstetrics, Breast, Musculoskeletal, Spine, Vascular, Oncology, Trauma, Pediatrics, with images taken from **8** modalities, *e.g.*, X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET), Digital Subtraction Angiography (DSA), Mammography, Ultrasound, and Pathology.

Our exploration of GPT-4V is guided by the following questions.

- **Can GPT-4V recognize the modalities and anatomical structures of medical images?** Recognizing various modalities (such as X-ray, CT, MRI, ultrasound, and pathology) and identifying different anatomical structures within these images lies the foundation for more sophisticated diagnosis.
- **Can GPT-4V localize different anatomical structures in the medical image?** Precisely localizing specific anatomical structures in an image is crucial for identifying abnormalities, ensuring that potential issues are addressed in the correct anatomical context.
- **Can GPT-4V discover and localize anomalies in medical images?** Detecting anomalies, such as tumors, fractures, or infections, is a primary goal of medical image analysis. For an AI model to be considered reliable in a clinical setting, it is required to not only discover these abnormalities but also accurately localize them, facilitating targeted interventions or treatments.
- **Can GPT-4V combine multiple images to make a diagnosis?** Medical diagnoses often require a holistic view, combining information from different imaging modalities or views. It is thus critical to probe GPT-4V’s ability to combine and analyze information from multiple images.
- **Can GPT-4V write medical reports, describing both abnormalities and relevant normal findings?** Writing reports is a time-intensive task for radiologists and pathologists. If GPT-4V can assist in this process by generating accurate and clinically relevant reports, it will certainly improve the efficiency of the entire workflow.
- **Can GPT-4V integrate patient medical history when interpreting medical images?** The patient’s basic information and past medical history can greatly influence the interpretation of current medical images. Considering this information during model prediction would lead to a more personalized and potentially more accurate analysis, considering all relevant patient-specific factors.
- **Can GPT-4V maintain consistency and memory across multiple rounds of interaction?** In some medical scenarios, a single-pass analysis may not be sufficient. This capability of maintaining

a. Medical systems



b. Imaging modalities

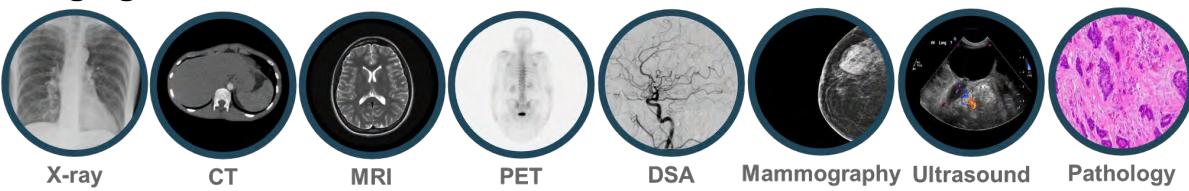


Figure 1 | The Diagram of Medical Systems and Imaging Modalities. In this paper we comprehensively consider 17 medical systems (Figure a) and our cases can cover 8 different imaging modalities (Figure b), i.e., X-ray, CT, MRI, PET, DSA, Mammography, Ultrasound, Pathology from left to right.

a coherent and reliable context throughout extended conversations or analyses, especially in intricate medical contexts where data continuity is critical.

1.2 Sample selection.

Guided by the aforementioned questions, we perform comprehensive case studies on various tasks. For radiology image recognition, diagnosis and report generation, we leverage the most famous radiology collection website, Radiopaedia*. For pathology image analysis, we collect hematoxylin and eosin (H&E) stained histopathology images of malignant tumors across 20 tissues from the professional pathology website, PathologyOutlines†. For localization capability analysis, we choose samples from several public medical image segmentation and detection benchmarks [11, 5, 4, 2, 15, 16, 6, 18, 1, 25, 14, 7].

1.2.1 Case selection.

Given GPT-4V has not provided APIs officially, we can only use its webpage version, thus set limitations on the scalability of our evaluation. In order to pick the most suitable cases, we mainly take the following considerations:

*<https://radiopaedia.org/>

†<https://www.pathologyoutlines.com/>

- **Release time.** Considering that GPT-4V has been extensively trained on web data, to guarantee fair evaluation on its generalisation, we only select cases that have appeared online in 2023, to avoid the data sample being part of the training set of GPT-4V.
- **Reliability of annotations.** Medical diagnosis normally requires strong expertise, it is crucial to select samples with reliable annotations. Luckily, on Radiopaedia, each uploaded case is commonly reviewed by a board of radiologists[‡], and accompanied by a completion ratio that indicates the sufficiency of information for diagnosis. We typically select cases with a completion ratio exceeding 90% as their reference descriptions are deemed more reliable.
- **Diverse imaging modalities.** For each body system, we aim to include a wide spectrum of imaging modalities available, while also reflecting the real-world distribution of images as accurately as possible. Consequently, for every system, we endeavor to encompass all the cases across different imaging modalities related to that body system. It's worth noting that we also pick cases that require to integrate multiple imaging modalities for decision making.

1.2.2 Image processing.

Here, we describe the rules to control the quality of input images:

- **Multi-image selection.** Many entries on Radiopaedia may contain more than four images, exceeding the upper input limitation for GPT-4V. Typically, we refrain from using such entries, as manually selecting images could result in omitting crucial ones. Nonetheless, on rare occasions, we might encounter this challenge. When faced with this situation, we will prioritize the four images that most closely align with the descriptions provided on Radiopaedia for input.
- **Key slice selection.** In medical imaging analysis, the data is usually represented as 3D volume. However, the current GPT-4V model is limited to only processing four image inputs per time maximally, which is notably smaller than the standard number of slices in medical 3D data, like CT and MRI scans. Given this constraint, we use the slice[§] that is most relevant to the case description and diagnosis, as suggested by expert radiologists while uploading images onto Radiopaedia website.
- **Intensity normalization.** For medical images, varying-intensity windows can reveal different structures. We utilize the default intensity window displayed on Radiopaedia, as set by the radiologists, for image input. For localization tasks, we clip the CT images at [-300, 300], while clip other images at the 0.5% and 99.5% percentiles of the intensity distribution. All the images are rescaled to [0, 1].

1.2.3 Question prompts.

For each case, we might pose various questions spanning multiple tasks, but our primary emphasis is on report generation and diagnosis. The question prompt for the same task may vary slightly with each inquiry, to test the robustness of GPT-4V on responding different text query formats. For example, for report generation, we may often use the prompts as “*Please Generate a radiology report for this images.*” or “*May you please write a report for the patient?*” and for diagnosis, we may often use “*Can you make a diagnosis for the patient?*” or “*Are there any abnormalities in the images?*”. For other types of questions, we will organize conversation freely without recommended prompts.

1.2.4 Annotation or reference caption.

In order to reduce the difficulty of checking the correctness of the GPT-4V responses, we have selected the image descriptions provided on Radiopaedia as references, which has been verified by a board of qualified radiologists. However, it's crucial to note that the references are not in standard format of clinical reports. The radiologists write about what captures their interest, potentially overlooking many standard statements.

[‡]<https://radiopaedia.org/editors>

[§]<https://radiopaedia.org/articles/key-image>

In other words, the description guarantees its accuracy but cannot ensure a comprehensive description of the patient’s condition. Therefore, in case analysis, only statements that directly conflict with the given reference will be marked as definite incorrect. For all other output information, it’s up to the readers to judge its correctness with expertise knowledge.

1.3 Testing procedure.

We evaluate GPT-4V using its online chat page¹. We begin the conversation by feeding in the images. Typically, we might pose one or two questions for each case, with subsequent questions as multi-round conversation. When turning to a new case, we initiate a fresh chat window to ensure GPT-4V doesn’t mistakenly leverage information from previous conversations related to other cases.

For pathology evaluation, two-round conversations are exploited across all images. The first round asks whether a report can be generated base on only the input image. The purpose of this round is to evaluate whether GPT-4V can recognize image modalities and tissue origin without given any related medical prompts. At the second round, we provide the correct tissue origin and ask whether GPT-4V can make a diagnosis based on both the pathology image and the information of its tissue origin. We expect GPT-4V to modify its report and provide a clear diagnostic result.

In localization evaluation, we follow a step-by-step manner: we first test whether GPT-4V recognizes the presence of the target in the provided image; then we ask it to generate the bounding box coordinates of the target, based on the top-left corner of the image is $(x, y) = (0, 0)$ and the bottom-right corner is $(x, y) = (w, h)$. We repeat the evaluation for each single localization task several times to get at least 4 predicted bounding boxes, calculate their IOU scores and pick the highest one to demonstrate its upper-bound performance; We then derive the averaged bounding box and calculate the IOU score to demonstrate its averaged performance. In particular, we notice that asking GPT-4V to identify the presence of abnormality may trigger its safeguard mechanism and cause it not answer or generate coordinate in further conversation. We thus directly ask it to localize the provided abnormality under such situations.

1.4 Case demonstration.

We show each evaluation cases in one figure as Fig. 2. “Prompt” represents the sentence or images input by the users. “GPT-4V” denotes GPT-4V’s response. Note that, with the safeguard mechanism, GPT-4V tends to always claim its incompetence as a radiologist, we will omit these declarations by default for better readability. “Reference answer” denotes the reference indicated according to the descriptions provided by the Radiopedia.

We employ **red** to emphasize incorrect statements in GPT-4V’s responses. The same color in the reference answer indicates the basis upon which we deem the response incorrect. Similarly, **green** is used to highlight correct content and the same color in reference indicating the sentences used to judge, and **yellow** is reserved for content that is uncertain or ambiguous.

Each case in localization evaluation is demonstrated in a figure as Fig. 3. We visualise the generated bounding boxes in **green**, the averaged bounding box in **red**, and the ground-truth segmentation / bounding box in **blue**. To highlight the region of interesting, we slightly lower the intensity of the input image in visualization.

1.5 Limitations of this report

Here, we discuss several limitations in our evaluation of GPT-4V for multimodal medical diagnosis.

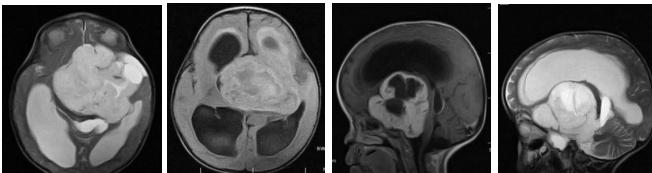
- **Only qualitative evaluation.** Given GPT-4V only provides online webpage interface, we can only manually upload test cases, causing this evaluation report to be limited on scalability, thus only qualitative evaluation can be provided.
- **Sample bias.** The selected samples are sourced from the online website, which may not reflect the data distribution in daily clinic routine. Specifically, most evaluation cases are abnormal cases, that may introduce potential bias in our evaluation.

¹<https://chat.openai.com/>

Central Nervous System: Case 3 cont.

Prompt

Generate a radiology report for these abnormal brain MRIs.



GPT-4V

Brain MRI - Axial and Sagittal Views

Clinical Indication: Not provided.

Technique: Multiple sequences of axial and sagittal images of the brain.

Findings:

1. Brain Parenchyma: The brain parenchyma appears largely intact. No evidence of significant mass effect or midline shift observed.
2. Lesions: There is a hyperintense lesion in the central region, possibly the region of the ventricles. The exact nature of the lesion is not clear from the images provided. Further sequences or contrast enhancement might be required for better characterization.
3. Ventricles: The ventricular system appears to be slightly enlarged, suggestive of some degree of hydrocephalus. The exact cause and type of hydrocephalus would need to be determined.
4. Cerebellum and Brainstem: No significant abnormalities are readily apparent in the cerebellum or brainstem.
5. Sinuses: Paranasal sinuses are not fully visualized in these cuts.

Impression:

1. Hyperintense lesion in the central region of the brain, further characterization required.
2. Possible hydrocephalus with enlarged ventricular system.

Recommendation: Correlation with clinical symptoms and further imaging, possibly with contrast, is recommended for a definitive diagnosis. A consultation with a neuroradiologist or neurosurgeon is advised for expert opinion. Please note, this is a general observation and not a definitive diagnosis. Always consult with a certified radiologist or physician for accurate interpretation and management.

Reference answer

A large sellar-suprasellar well-margined lobulated necrotic solid mass that is heterogeneous T2/FLAIR hyperintense and hypointense on T1WI. The solid component demonstrates enhancement on T1 C+ sequences. The mass superiorly projects into the third and lateral ventricles (left>right) to cause severe obstructive hydrocephalus. Subependymal edema and peripheral effacement of cerebral sulcations is demonstrated.

Figure 2 | A Demonstration Case From Central Nervous System. "Cont." denotes this sample is a continuation of the case titled as "Central Nervous System: Case 3". Red in the figure denotes the incorrect parts, green denoting correct parts and yellow for uncertainty. The colored sections within the "Reference Answer" indicate the corresponding evidence for judging GPT-4V's response. You can find detailed explanation for this case in Fig. 7.

- **Incomplete annotation or reference captions.** The reference reports obtained from the Radiopaedia/PathologyOutlines website are mostly unstructured, and not of standardized radiology/pathology report formatting. In particular, a majority of these reports primarily focus on describing abnormalities rather than providing comprehensive descriptions of the cases.
- **Only 2D slice input.** In real clinical settings, radiological images, including CT, MRI scans, are typically in the 3D DICOM format, however, as GPT-4V only supports up to four 2D images as input, we can only feed in 2D key slices or small patches (for pathology).

In summary, while our evaluation may not be exhaustive, we believe that this analysis offers valuable insights

Abdomen CT: Localization of Kidney (Case 2)



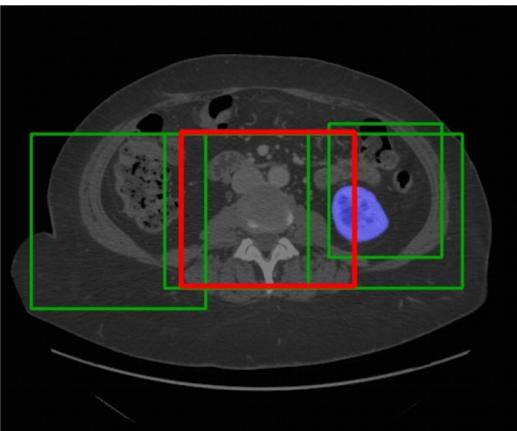
Prompt

This is an abdomen CT image, how many kidneys does it include?

GPT-4V

The image appears to be an axial (cross-sectional) view of an abdominal CT scan. Based on the image provided, I can see two kidney-shaped structures, suggesting that there are two kidneys present in this slice of the image.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

No, there is only one kidney in the image. Please tell it is the right kidney of the patient or the left one. Then localized it in the image using bounding box.
The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (507, 446)$.

GPT-4V

The kidney visible in the image is on the patient's left side, which is on the right side of the image as we view it. I'll provide coordinates for a bounding box around it:

Bounding box coordinates:

Top-left corner (x_1, y_1) : Approximately $(300, 150)$

Bottom-right corner (x_2, y_2) : Approximately $(450, 300)$

Figure 3 | A Demonstration Case for Localization Evaluation. The upper image is the input to GPT-4V, while the bottom image visualize the predictions and ground-truth. The generated bounding boxes are in **green**, the averaged bounding box is in **red**, and the ground-truth segmentation / bounding box is in **blue**. To highlight the region of interesting, we slightly lower the intensity of the input image in visualization.

for both researchers and medical professionals, it sheds light on the current capabilities of the multimodal foundational model and may inspire future work towards building medical foundation models.

2 Observations

In this section, we provide a summary of the observations from our case studies, following the questions listed in Sec. 1.1. Our evaluation encompasses a comprehensive assessment of VQA, report generation, and disease diagnosis tasks on radiology images, covering a total of 92 cases obtained from 17 systems, which collectively involve 266 images. Additionally, we delve into a detailed evaluation of 12 specific localization

tasks in Sec. 3.18.

Moreover, for pathology images, we also evaluate report generation and medical diagnosis tasks, conducting patch-level studies encompassing 20 distinct malignant tumors from different tissues. The specific observations of pathology images are provided in detail in Sec. 4.

2.1 GPT-4V can recognize the modality and anatomy of medical images.

Modality Recognition. For most cases we examined, GPT-4V is able to recognize the imaging modality correctly, as indicated by the following examples, Mammography (Figs. 62 and 93), X-ray (Figs. 10, 17, 48, 50, 53, 56, 59, 79, 80 and 85), CT(Figs. 16, 21 and 82), MRI (Figs. 18, 53, 61, 81 and 119), Ultrasound (Figs. 15, 58 and 67), Nuclear Imaging (Fig. 83), Pathology (Figs. 140 to 159). Nonetheless, there remains cases where the model faces challenges in determining the modality. For instances, in Fig. 66, there is uncertainty in determining whether the input is MRI or CT. However, given that MRIs are rarely used for breast imaging, such hesitation is acceptable.

Anatomy Recognition. In the majority of evaluated samples, GPT-4V can correctly identify the target anatomical structures, as indicated by the following examples, Head and Neck (Figs. 16, 18 and 19), Spine (Figs. 80 to 82 and 84 to 86), Breast (Figs. 62 to 64 and 67), Chest and Cardiac (Figs. 30 and 48), Abdomen and Pelvis (Figs. 47, 50, 52, 54, 56 and 79), Musculoskeletal (Figs. 46 and 74), Vascular (Figs. 88 and 90) and Others (Figs. 10, 59 and 61). In cases involving multiple images, GPT-4V can identify which body parts in the images require special attention and analyze them separately, even if the analysis turns out to be incorrect, as indicated by Fig. 28. However, in Fig. 53, GPT-4V misclassified Pelvic MRI as knee MRI.

Plane Recognition. GPT-4V has shown promising performance in distinguishing various imaging planes, be it sagittal, axial, or coronal, as evidenced in Figs. 16, 23, 37, 47, 60 to 62, 79, 81, 82, 84, 98 and 100. It can even distinguish the imaging axial correctly (mediolateral oblique (MLO) or craniocaudal (CC) for mammography) as shown in Fig. 62. While in Figs. 18, 52 and 53, GPT-4V fails to predict the plane of the first image.

2.2 GPT-4V can hardly make accurate diagnoses.

OpenAI seems to have set strong safe guard system, to strictly avoid the GPT-4V to make direct diagnosis. As shown in Figs. 4, 8, 10, 17, 58, 62 and 63, GPT-4V may refuse to give clear diagnosis conclusion. While for most cases it responds, GPT-4V is still far away from meeting the demand for clinical diagnosis, it simply lists out different diseases based on general medical knowledge, instead of diagnosing the images of interest (Figs. 21, 83 and 143), or fails completely (Fig. 68). In several cases, where the contrast between normal and abnormal areas is very significant, it can localize the abnormality Figs. 48 and 71. This is a significant limitation given the critical importance of accurate diagnostics in the medical field.

2.3 GPT-4V can generate structured reports, with incorrect content.

We probe GPT-4V’s ability to generate medical reports with illustrative examples covering various anatomical areas, for example, Head and Neck (Figs. 18 and 19), Spine (Figs. 80 and 81), Breast (Figs. 62 and 64), Chest and Cardiac (Figs. 24, 28 and 33), Abdomen and Pelvis (Figs. 36, 47, 49, 50, 52, 54, 56, 79 and 86), Musculoskeletal (Fig. 34), Vascular (Fig. 87), Oncology (Fig. 93).

It can be observed that GPT-4V always generates reports in a structured template, unlike manually written clinical reports, which tend to be more flexible in content. For instance, in the case of mammography report generation, GPT-4V will always response term by term, even though most listed aspects in the report are normal and nothing worth noting. However, when facing the input consisting of various imaging modalities (Figs. 67 and 81), it may fail to write typical reports, degrading to picture-by-picture descriptions, and cannot give a comprehensive conclusion combining all images.

Overall, despite the reports generated by GPT-4V are structured and generally consider the anatomical regions of interest, the report content is not always correct.

2.4 GPT-4V can recognize text and markers in images, but lacks understanding.

GPT-4V shows the ability of Optical Character Recognition (OCR), *i.e.*, extracting and interpreting text from images (Figs. 49, 57, 65 and 99). For such cases, GPT-4V may focus on the textual content and overlook the image content itself, as observed in Figs. 91 and 92. As indicated by Figs. 24 to 26 and 121, it can be observed that the text or markers in images tends to pose significant effects on the model's prediction.

In addition, GPT-4V is able to recognize and interpret various visual markers in medical images, such as arrows (Figs. 35, 47 and 158) and circles, which can direct the model to identify and analyze regions of interest, providing valuable cues for diagnostic process. When text annotations are added next to the arrows, as shown in Fig. 30, GPT-4V is capable of accurately recognizing the text and presenting a complete and accurate radiology report.

It is important to note that despite the strong OCR ability in GPT-4V, its robustness requires to be further improved, as it may also fail to recognize the text on the image (Fig. 90) or mis-interpret the medical annotations on images (Fig. 65).

2.5 GPT-4V can identify medical devices and their locations in images.

GPT-4V shows satisfying performance in accurately identifying medical devices in various modal images and indicating their location, as highlighted in Figs. 22, 33 and 115. This may suggest that GPT-4V is more sensitive to relatively obtrusive objects since they have more distinguishing features than pathological ones.

2.6 GPT-4V faces difficulties on analyzing multiple images.

When multiple images of different modalities are used as input, GPT-4V always tends to analyze each image separately (Figs. 5, 14, 16, 18, 31, 38, 51, 52, 54, 60, 61 and 101). In most cases, it clearly recognizes the number of input images and describes their contents comprehensively, regardless of whether the input images are of same imaging modality, as shown in Figs. 31, 82 and 106. However, we also find if the input images hit the limitation, *i.e.*, four images, GPT-4V may ignore the text context (Figs. 105 and 107).

2.6.1 Multiple images with different views within the same modality.

When the images given are different views of the same modality (axial, coronal, sagittal), GPT-4V is able to recognize the corresponding views. GPT-4V tends to provide separate descriptions for each view within the findings section (Fig. 37), rather than describing them with structured templates. Occasionally, it can conclude its analysis into a comprehensive diagnosis within the impression section, as exemplified in Fig. 52. Notably, when GPT-4V understands the inherent relationship between different viewpoints, it can indeed achieve significantly better results than with a single view, as shown in Fig. 117.

2.6.2 Multiple images from different modalities.

When presented with images from different modalities, it is more challenging for the model to make a diagnosis, even when it is told the images are of different modalities for the same anatomy (Fig. 27). As a result, when confronted with multiple images, it can not effectively leverage the contextual information provided by the other modalities.

2.7 GPT-4V's prediction heavily relies on patient's medical history.

The inclusion of patient information and medical history within the prompt has a notable impact on the output of the model, as illustrated in Figs. 17 to 19, 50 and 58. Textual information can help GPT-4V focus on specific areas of interest, making it easier to obtain accurate results, as demonstrated in Figs. 35 and 89. When these contextual details are absent, the model tends to give prediction with normalcy diagnosis, when presented with a medical image (Fig. 96). In contrast, when comprehensive patient information and medical history are provided, the model demonstrates the ability to make inferences about potential abnormalities within the image, drawing upon the patient's past medical conditions to inform its response (Fig. 97).

2.8 GPT-4V cannot localize the anatomical structures or anomalies in medical images.

As shown in Fig. 124 to Fig. 139, GPT-4V shows poor performance on localizing the anatomical structures or anomalies in medical images. We draw such conclusion based on the following observations: (i) GPT-4V can generate irrational bounding boxes far away from the ground-truth, getting 0.0 IOU scores in every turns of prediction, shown in Figs. 127, 138 and 139; (ii) even though GPT-4V sometimes gives an acceptable prediction in one turn, it shows high variance after repeating the evaluation for several times, thus the averaged bounding box gets a low IOU score, as shown in Figs. 124 and 128 to 130; (iii) GPT-4V shows strong bias in certain situations, such as the sacrum is at the bottom of Spine MRI images and cerebellum is at the bottom of Brain MRI images. Thus it will make predictions regardless of the input images, as shown in Fig. 132 and Fig. 134; (iv) **the averaged IOU score of all cases is only 0.16, which is far from being reliable.**

2.9 GPT-4V can change answers with guidance in multi-round interaction.

With proper guidance, as illustrated in Figs. 33, 53, 121 and 122, GPT-4V can modify its responses to be correct over a series of interactions. For example, in the case shown in Fig. 53, we input the MRI images of endometriosis. GPT-4V initially misclassified Pelvic MRI as knee MRI, yielding an incorrect response. With a multi-round interaction involving user correction, the model ultimately made an accurate diagnosis.

2.10 GPT-4V suffers from hallucination issues.

Hallucination refers to the generation of responses that sound natural, but are factually incorrect, nonsensical, or unfaithful to the provided source input. Take the report generation task as an example (Figs. 20, 86, 88, 93, 118 and 123), although GPT-4V can generate reports conforming to a standard structural template. However, the content within these reports is often inaccurate, even when there exists obvious abnormalities in the images (Fig. 95) or certain areas already identified (Fig. 103).

2.11 Performance variation and inconsistency.

GPT-4V exhibits significant variations in performance when being tasked to analyze common imaging modalities (Figs. 5, 6, 15, 16 and 58) compared to rare ones (Figs. 8, 10, 12, 14, 17 and 61) in terms of different body systems. Additionally, its analysis of the same medical image can yield inconsistent results with different prompts, for example, as shown in Fig. 4, GPT-4V initially predicts the given image as being abnormal under prompt "What is the diagnosis for this brain CT?", however, it later generates a report that considers the same image to be normal. This inconsistency underscores the fact that GPT-4V's performance in clinical diagnosis can potentially be unstable and unreliable.

2.12 Safety.

We found that GPT-4V has set up safeguard against potential misuse, ensuring users to understand its capabilities before using. For example, When asked to make a diagnosis, for example, "*Please provide the diagnosis for this chest X-ray.*", it may refuse to offer an answer, or pose emphasis on "I'm not a substitute for professional medical advice", or include phrases like "appears to be" or "could be", to express uncertainty as shown in Fig. 87.

3 Qualitative Analysis of Radiology

3.1 Central Nervous System

The central nervous system comprises the brain, spinal cord, their associated vascular structures, and the enclosing membranes, known as the meninges. The central nervous system examinations usually include cranial nerve examination, movement system inspection, sensory system examination, physiological/pathological reflex examination and autonomic nervous system examination etc. The imaging modalities in central nervous system examinations involve CT, MRI, X-ray, ultrasound, angiography, and nuclear medicine imaging. We have shown seven cases in Figs. 4 to 14.

3.2 Head and Neck

In radiology, the ‘head and neck’ refers to all the anatomical structures in this region excluding the central nervous system. Many pathologies are confined to a particular area of the head and neck, thus separating this section of the human body exceptionally useful. CT, MRI, X-ray, ultrasound, and angiography are often used to diagnose the relevant diseases. We have shown five cases in Figs. 15 to 19.

3.3 Cardiac

The cardiac system, central to human physiology, benefits immensely from radiological advancements. Radiology is indispensable in diagnosing, monitoring, and managing cardiac conditions. Based on the data collected from Radiopedia, the main imaging modalities are CT and X-rays. In addition, MRI, ultrasound, and other modes also exist despite their relatively small amount. Figs. 20 to 27 show examples of different modalities in different cases and comparisons between different evaluation settings.

3.4 Chest

Radiological examinations of the chest encompass a range of imaging modalities, including PET, CT, MRI, X-ray, and ultrasound. These diagnostic tools yield valuable insights into the intricate anatomy and pathology of the lungs, heart, chest wall, mediastinum, and thoracic structures. They play a pivotal role in the detection, diagnosis, monitoring, and treatment planning of various thoracic conditions. Figs. 28 to 32 demonstrate examples of different modalities.

3.5 Hematology

Radiological reporting in hematology lies in its crucial role in the diagnosis, staging, and monitoring of hematological disorders. CT, MRI, X-ray, and ultrasound offer a non-invasive means to assess various aspects of hematological conditions. These modalities enable the visualization and characterization of lymph nodes, spleen, liver, bone marrow, and other relevant structures, aiding in the detection and evaluation of primary and metastatic hematological malignancies, as well as non-malignant hematological disorders. We have shown five cases in Figs. 33 to 38.

3.6 Hepatobiliary

The hepatobiliary system is critical for digestion and composed of the biliary tract and liver. The liver is located in the abdomen, as the largest organ, it plays essential roles in homeostasis, including metabolism, glycogen storage, drug detoxification, production of various serum proteins, and bile secretion. We have shown examples in Figs. 39 to 46.

3.7 Gastrointestinal

The gastrointestinal system comprises the GI tract and accessory organs. The GI tract consists of the oral cavity, pharynx, esophagus, stomach, small intestine, large intestine, and anal canal. The accessory organs include the teeth, tongue, and glandular organs such as salivary glands, liver, gallbladder, and pancreas. The imaging modalities in gastrointestinal system examinations involve X-ray, CT, MRI, and Ultrasound. We have shown examples in Figs. 47 to 51.

3.8 Urogenital

The urogenital system, comprised of both the urinary and genital organs, holds significant importance in radiological assessments. Given the intricacies of its structure and function, a precise and detailed understanding is imperative for diagnosing pathologies affecting these regions. Radiology plays an instrumental role in the visualization, diagnosis, and management of diseases related to the kidneys, ureters, bladder, urethra, prostate, testes, ovaries, and other associated structures. Common imaging modalities utilized for urogenital assessments include CT(including annotation), MRI, X-ray(including fluoroscopy), ultrasound. These tools not only facilitate the identification of anomalies, but also aid in therapeutic interventions when necessary. Examples of different modalities and comparisons among different evaluation settings are shown by Figs. 115,

116 and 118 to 123.

3.9 Gynecology

The gynecology system focuses on the female reproductive system, specifically, the uterus, ovaries, and other related organs. We have shown five cases in Figs. 52 to 56.

3.10 Obstetrics

Obstetrics is the field of study concentrated on pregnancy, childbirth and the postpartum period. The most common imaging modality used in examination is Ultrasound. MRI, CT, and X-ray may also be used to screen and diagnosis. We have shown examples in Figs. 57 to 61.

3.11 Breast

Breast system includes diverse radiologic exams, focusing on the breast and the main imaging modality is mammography, that uses low-dose X-rays to shoot the breast, screening for breast cancer. Besides, ultrasound, MRI, and CT may also be used to screen or diagnose. We have shown examples in Figs. 62 to 68.

3.12 Musculoskeletal

The musculoskeletal system supports our body with movement ability. It can be divided into two broad systems, muscular system, which covers all types of muscles in the body, and skeletal system composed of the bones. We have shown examples in Figs. 69 to 78.

3.13 Spine

The spine system comprises the vertebrae, facet joints, intervertebral disks, spinal cord, nerves, and soft tissues. In this section, we present diverse exams across different modalities, including X-ray, CT, MRI, and Nuclear medicine. We have shown examples in Figs. 79 to 86.

3.14 Vascular

Radiology reports provide a detailed assessment and diagnosis of the vascular system, as well as guide relevant treatments and interventions. Vascular radiology reports utilize various imaging techniques such as CT, MRI, Fluoroscopy, Nuclear Medicine and ultrasound to provide information about vascular anatomy, hemodynamics, and vascular pathologies. We have shown examples in Figs. 87 to 92.

3.15 Oncology

Radiology plays a pivotal role in oncology, aiding in the detection, staging, and monitoring of cancers. Advanced imaging modalities like X-ray, CT, MRI, PET, and ultrasound provide insights into tumor morphology, metastatic spread, and treatment response. These diagnostic tools not only help in characterizing tumors, but are also instrumental in treatment planning and post-therapeutic surveillance. There are eleven cases with these modalities and comparisons among different evaluation settings shown as Figs. 93 to 103.

3.16 Trauma

The trauma system refers to a medical specialty that focuses on the treatment of physical injuries, typically severe, which are often caused by accidents, falls, sports injuries, and violence. X-ray is the most commonly used imaging modality and besides, CT and MRI are sometimes used. We have shown examples in Figs. 104 to 108.

3.17 Pediatrics

Pediatrics is the branch of medicine dedicated to the medical care of infants, children, and adolescents, spanning from birth up to the age of 18 (and sometimes beyond). Since most common patients are adults, the cases in this system may be viewed as hard examples. CT, MRI, X-ray, and ultrasound are all commonly

used imaging techniques in this system. We have shown examples in Figs. 109 to 114.

3.18 Localization

Localization of anatomical structures and anomalies is a critical procedure in medical diagnosis, which facilitates the analysis, diagnosis and treatment. Depending on the clinical needs, the localization tasks could be applied to a wide range of targets on different modalities. In this evaluation, we consider 12 specific localization tasks: localization of pneumothorax in Chest X-ray image (Fig. 124); localization of cardiomegaly in Chest X-ray image (Fig. 137); localization of mass in breast X-ray image (Fig. 138) and localization of fracture in palm X-ray image (Fig. 139); localization of spleen in abdomen CT image (Fig. 125); localization of liver and liver tumor in abdomen CT images (Figs. 126 and 127); localization of kidneys and tumors in abdomen CT images (Figs. 128 to 130); localization of sacrum in spine MRI images (Figs. 131 and 132); localization of cerebellum in brain MRI images (Figs. 133 and 134); localization of brain tumor in MRI images (Figs. 135 and 136).

4 Qualitative Analysis of Pathology

Pathological diagnosis is currently the golden standard for examining malignant tumors in clinical applications. In this section, to investigate the capabilities of GPT-4V, on report generation and medical diagnosis for pathology images, we perform patch-level study encompassing 20 distinct malignant tumors from different tissues.

4.1 Procedure of pathology evaluation

We conduct a two-round conversations with GPT-4V across all test cases. At the first round, we input both a pathology image and a formatted question "May you please write a report for this image?". This aims to test whether GPT-4V can identify image modalities and then write a structured report for this pathology image with no medical prompts provided. At the second round, the tissue origin of each pathology image is fed to GPT-4V and a formatted question "What is most likely diagnostic result based on the image and report?" is entered. We expect to probe GPT-4V's ability on modifying the report with the new medical prompt, thus make a clear diagnosis for the given pathology image.

4.2 Pros and cons of GPT-4V on pathology image analysis

- **P1. Modality identification.** GPT-4V can identify the modality of all tested pathology images (H&E stained microscopic view of tissue sample), as shown in the first few sentences of the generated report in Figs. 140 to 159.
- **P2. Report generation.** Given a single pathology image without any medical prompts, GPT-4V can generate a structured and detailed report to describe the image features, as shown in Figs. 140 to 159. In 7 (Figs. 140, 142, 144, 147, 149, 153 and 158) out of 20 cases, GPT-4V impressively itemizes its observations by terminologies, such as "Tissue architecture", "Cellular characteristics", "Stroma", "Glandular structures", "Nuclei", etc. Encouragingly, GPT-4V can correctly recognize glandular structures (Figs. 144, 147, 154, 155, 158 and 159) and epithelium features (Figs. 140, 141, 153 and 156) from pathology images across different tissues.
- **P3. Prompt-guided modification.** At the second round conversation, GPT-4V can largely modify its report based on the new medical prompt of tissue origin, as shown in Figs. 155 and 157, and provide one certain diagnosis Figs. 144, 146, 147 and 154 for predicted normal case, or several potential options for predicted abnormal ones (Figs. 140, 142, 143, 145, 148 to 150, 152, 156, 158 and 159).
- **C1. Knowledge-based description** Although GPT-4V can write a structured report for pathology images, many detailed descriptions about cell and nuclei are general features of H&E stained images, not image-specific patterns. For instance, the description of "purple-stained nuclei surrounded by a pinkish cytoplasm" in Fig. 141 and "The tissue section demonstrates layers of epithelial cells with nuclei

stained dark purple by the hematoxylin. The cytoplasm of the cells is stained pink by the eosin" in Fig. 146. Additionally, the diagnostic results provided by GPT-4V could also derive from general medical knowledge rather than the morphological structures of the given pathology image, as shown in Fig. 143.

- **C2. Limited diagnostic performance.** In summary, GPT-4V misdiagnoses four cases as normal tissues (Figs. 144, 146, 147 and 154), correctly diagnoses 3 tumors from the tissue of bladder(Fig. 141), CNS(Fig. 145) and oral cavity(Fig. 153), and leaves vague diagnoses for the rest 13 malignant tumors. Especially for the tissue of anus (Fig. 140), uterus (Fig. 159), the diagnostic results of GPT-4V vary from normal tissues to malignant tumors, indicating that GPT-4V may not truly detect the abnormalities from these pathology image.

Central Nervous System: Case 1

Prompt

What is the diagnosis for this brain CT?



GPT-4V

I am not a medical professional, but the provided image appears to be a non-contrast axial CT scan of the brain. From this image alone, one might note a hyperdense (whiter) area which seems to be in the region of the left basal ganglia and surrounding structures. This could be suggestive of several conditions, including but not limited to:

1. Acute intracerebral hemorrhage.
2. Hyperdense artery sign (in case of an acute ischemic stroke).
3. Other space-occupying lesions.

It's essential to be aware that the interpretation of radiologic images requires expertise and correlation with clinical presentation and other diagnostic studies. It's crucial to consult with a radiologist or neurologist for an accurate diagnosis. If you or someone you know is concerned about a medical condition, please seek advice from a healthcare professional.

Reference answer

Extensive subarachnoid hemorrhage

Prompt

Generate a radiology report for this head CT scan.

GPT-4V

I'm not a radiologist, and the following is not a substitute for a professional interpretation, but based on the provided CT image of the head:

Radiological Findings:

1. The ventricular system appears within normal limits in size and shape.
2. No obvious signs of midline shift or mass effect.
3. The cortical sulci and basal cisterns appear preserved.
4. No overt hyperdense or hypodense lesions noted.
5. The bone structures of the skull appear intact with no visible fractures.
6. Sinuses and mastoid air cells appear clear.

Impression:

1. No acute radiological findings identified on the provided single axial slice of the head CT.

However, a complete assessment requires a review of the entire series of images. Clinical correlation is advised, and any clinical concern should prompt a comprehensive review by a qualified radiologist. Always consult with a licensed radiologist for an official diagnosis and report.

Reference answer

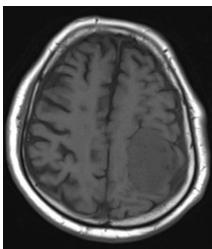
Extensive subarachnoid hemorrhage involving all basal cisterns and the pituitary fossa; right frontal and left frontoparietal sulci, including bilateral frontal parafalcine sulci; bilateral Sylvian cistern and fissure; all four ventricles (small amount); premedullary cistern, foramen of Magendie, and foramina of Luschka.

Figure 4 | Central Nervous System: Case 1. This case shows a subarachnoid hemorrhage CT image of the brain. During diagnosis, GPT-4V recognizes the abnormality and lists multiple choices but can't give a precise diagnosis. While generating the report, GPT-4V instead thinks it's a normal image. This case shows that GPT-4V can't give an accurate diagnosis and can be inconsistent under different prompts. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/ruptured-aca-a1-aneurysm-diagnosis-and-treatment?lang=us>.

Central Nervous System: Case 2

Prompt

What is the diagnosis of this brain MRI?



GPT-4V

The provided image is an **axial view of a brain MRI**. Based on the single slice provided:

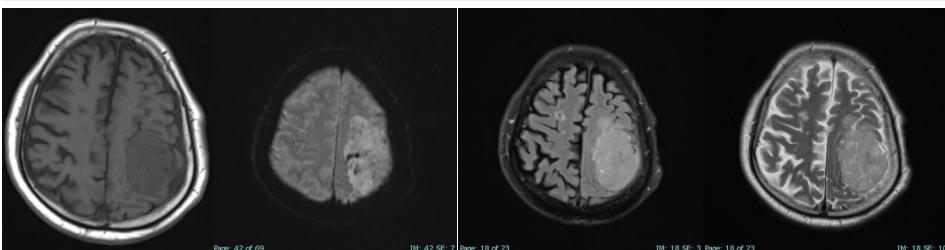
There appears to be **an area of hyperintensity or increased signal** in the **right frontal lobe**, which could be suggestive of various pathologies. These may include, but are not limited to, a **glioma, metastasis, demyelinating lesion, infarct**, or other types of lesions.

However, accurate diagnosis from a single MRI slice is challenging, and MRI interpretation requires viewing multiple sequences (T1, T2, FLAIR, DWI, post-contrast images, etc.) and multiple slices to make a definitive diagnosis.

Moreover, correlating the imaging findings with clinical symptoms, patient history, and other investigations is crucial. It's essential to consult with a radiologist or neurologist for a comprehensive evaluation and accurate diagnosis.

Prompt

What is the diagnosis of these brain MRIs?



GPT-4V

Based on the provided MRI images, there appears to be a **sizable lesion** in the **right frontal lobe** of the brain. Features observed in the images:

1. **T1 Weighted Image (first image):** The lesion is **hypointense** (darker) relative to surrounding brain tissue.
2. **T2 Weighted Image (second image):** The lesion demonstrates **hyperintensity** (brighter) with surrounding **vasogenic edema** (swelling) which is also **hyperintense**.
3. **T1 Post-Contrast Image (third image):** There is a central area without enhancement, suggestive of necrosis, surrounded by **ring enhancement**.
4. **Diffusion Weighted Image** (fourth image, if correct assumption): This type of image helps in determining the diffusion characteristics of a lesion.

The features – particularly the ring enhancement on post-contrast images, central necrosis, and surrounding edema – are characteristic of **glioblastoma multiforme (GBM)**, which is a high-grade primary brain tumor. However, other possibilities include metastatic tumors, brain abscess, or other less common entities.

It's essential to understand that while these features are suggestive of GBM, a definitive diagnosis requires a combination of imaging, clinical context, and, most critically, histopathological examination (biopsy). Please consult a neurologist or neurosurgeon for an expert opinion and potential next steps for management.

Reference answer

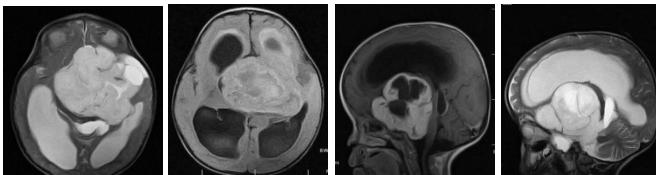
Meningioma.

Figure 5 | Central Nervous System: Case 2. This case shows meningioma brain MRI images. When giving single brain MRI image, GPT-4V recognizes the abnormality and lists multiple choices but can't give a concrete diagnosis. When giving multiple brain MRI images, GPT-4V gives more analysis for each image and gives one concrete diagnosis. But it says the wrong MRI modalities and diagnosis. This case shows that GPT-4V may concretize its conclusion with more visual prompts but not necessarily improve accuracy. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/meningioma-114?lang=us>. | 22

Central Nervous System: Case 3

Prompt

What is the diagnosis for these brain MRIs?



GPT-4V

I'm not a medical professional, but these appear to be MRI images of the brain. Based on the images provided, there seem to be **large mass lesions** in the brain. These could be consistent with **tumors**, **abscesses**, or other **space-occupying lesions**. The exact nature, be it benign or malignant, and other specifics cannot be determined without a proper clinical evaluation, additional imaging studies, and possibly biopsy. If these are your MRI scans or belong to someone you know, it's crucial to consult with a radiologist or neurologist for a proper diagnosis and any necessary follow-up.

Reference answer

Adamantinomatous craniopharyngioma (**tumor**)

Prompt

Can you describe the location of the mass in the brain?

GPT-4V

Certainly. Based on the provided MRI images: The mass appears to be located in the **brain's posterior region**, **predominantly affecting the cerebellum**. The cerebellum is situated at the back of the brain, beneath the cerebral hemispheres, and is primarily responsible for coordinating movement. Please note that while I can provide general observations based on the images, I'm not a medical professional. For an accurate interpretation and diagnosis, consulting with a radiologist or neurologist is essential.

Reference answer

The mass is located in the **sellar-suprasellar area**. It projects superiorly into the **third and lateral ventricles** (left>right), causing severe obstructive hydrocephalus.

Prompt

What is the nature of the mass? Is it solid or cystic?

GPT-4V

Based on the provided MRI images: The mass in the brain appears to **have both solid and cystic components**. The **brighter (hyperintense) regions on the T2-weighted images** (the images you've provided appear to be T2-weighted given the cerebrospinal fluid is bright) could represent **cystic or necrotic portions**, while the **other regions could represent more solid tumor components**.

However, it's essential to understand that MRI interpretation requires specialized training, and my observation is based on the images provided and general knowledge. The exact nature of the lesion — whether it's benign or malignant, its type, and other specifics — would require a detailed radiological evaluation, often in combination with clinical history, physical examination, and other diagnostic tests. Always consult with a radiologist or neurologist for a definitive interpretation and diagnosis.

Reference answer

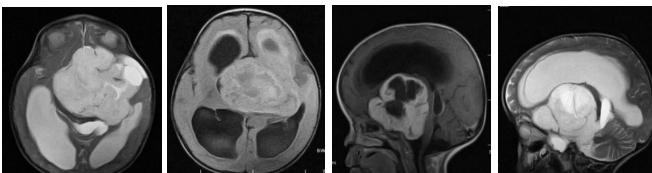
The mass is a large, well-defined, lobulated, necrotic **solid mass**.

Figure 6 | Central Nervous System: Case 3. This case shows several adamantinomatous craniopharyngioma brain MRI images. During diagnosis, GPT-4V tells the sizeable lesion and gives multiple possible conclusions. It fails to localize the lesion but precisely tells the lesion is both solid and cystic based on its signal on T2-weighted image. The case shows GPT-4V have basic medical knowledge. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/adamantinomatous-craniopharyngioma-44?lang=us>.

Central Nervous System: Case 3 cont.

Prompt

Generate a radiology report for these abnormal brain MRIs.



GPT-4V

Brain MRI - Axial and Sagittal Views

Clinical Indication: Not provided.

Technique: Multiple sequences of axial and sagittal images of the brain.

Findings:

1. **Brain Parenchyma:** The brain parenchyma appears largely intact. No evidence of significant mass effect or midline shift observed.
2. **Lesions:** There is a hyperintense lesion in the central region, possibly the region of the ventricles. The exact nature of the lesion is not clear from the images provided. Further sequences or contrast enhancement might be required for better characterization.
3. **Ventricles:** The ventricular system appears to be slightly enlarged, suggestive of some degree of hydrocephalus. The exact cause and type of hydrocephalus would need to be determined.
4. **Cerebellum and Brainstem:** No significant abnormalities are readily apparent in the cerebellum or brainstem.
5. **Sinuses:** Paranasal sinuses are not fully visualized in these cuts.

Impression:

1. Hyperintense lesion in the central region of the brain, further characterization required.
2. Possible hydrocephalus with enlarged ventricular system.

Recommendation: Correlation with clinical symptoms and further imaging, possibly with contrast, is recommended for a definitive diagnosis. A consultation with a neuroradiologist or neurosurgeon is advised for expert opinion. Please note, this is a general observation and not a definitive diagnosis. Always consult with a certified radiologist or physician for accurate interpretation and management.

Reference answer

A large sellar-suprasellar well-margined lobulated necrotic solid mass that is heterogeneous T2/FLAIR hyperintense and hypointense on T1WI. The solid component demonstrates enhancement on T1 C+ sequences. The mass superiorly projects into the third and lateral ventricles (left>right) to cause severe obstructive hydrocephalus. Subependymal edema and peripheral effacement of cerebral sulcations is demonstrated.

Figure 7 | Central Nervous System: Case 3. In the generated report, GPT-4V successfully recognizes the hydrocephalus and the hyperintense lesion. It proves GPT-4V have basic medical knowledge to do recognize some diseases and lesion intensities in MRI. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/adamantinomatous-craniopharyngioma-44?lang=us>.

Central Nervous System: Case 4

Prompt

What is the diagnosis for this brain ultrasound?



GPT-4V

I'm not a medical professional, but the image appears to be an ultrasound, possibly of a brain structure. It's important to consult with a radiologist or a medical specialist to get an accurate diagnosis and interpretation of any medical images. They can provide comprehensive insights based on their expertise and training.

Reference answer

Grade IV germinal matrix hemorrhage with periventricular leukomalacia There is bilateral germinal matrix hemorrhage that extends into the parenchyma and dilated ventricles (grade IV). Right anterior horn ventricle craniocaudal dimension; 10 mm on the right and 10 mm on the left. Grey-white matter differentiation is preserved. Cortical folding is appropriate for age. Normal echogenicity and homogeneity of subcortical white matter. Thalamus and basal ganglia are normal. The width of the subarachnoid spaces are appropriate for age. No midline shift.

Prompt

What is the grade of bilateral germinal matrix hemorrhage in the patient?

GPT-4V

I'm not a doctor, but the image appears to show an ultrasound of the brain, and you seem to be referring to germinal matrix hemorrhage (GMH), which is a type of intraventricular hemorrhage (IVH) commonly seen in premature infants. There are several grading systems for GMH/IVH. The most commonly used system classifies the hemorrhages into four grades:

- Grade I: Hemorrhage is limited to the germinal matrix.
- Grade II: Hemorrhage extends into the lateral ventricles but does not cause ventricular dilation.
- Grade III: Hemorrhage fills and enlarges the ventricles.
- Grade IV: Hemorrhage extends into the brain tissue surrounding the ventricles.

Based on the provided image, it's challenging to definitively determine the grade of the GMH/IVH. Accurate diagnosis and grading would require a comprehensive evaluation of the images by a trained radiologist or neonatologist. If this is a medical concern, it's crucial to consult with a healthcare professional for an accurate diagnosis."

Reference answer

Grade IV.

Figure 8 | Central Nervous System: Case 4. This case shows a Grade IV germinal matrix hemorrhage ultrasound brain image. GPT-4V fails to give the diagnosis and the specific grade of the germinal matrix hemorrhage. It suggests GPT-4V may perform poorly on rare image modalities like ultrasound in central nervous system examinations and lack the ability to handle fine-grained questions. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/grade-iv-germinal-matrix-haemorrhage-with-periventricular-leukomalacia?lang=us>.

Central Nervous System: Case 4 cont.

Prompt

Generate a radiology report for these abdominal brain ultrasound images.



GPT-4V

I'm not a radiologist, but if I were to create a general outline based on the provided image, it might look something like this:

Patient: [Patient's Name]

Study: Abdominal Brain Ultrasound

Date: [Date of the study]

Technologist: [Technologist's name]

Referring Physician: [Referring Physician's name]

Clinical Information: [Patient's symptoms or reason for the ultrasound]

Findings:

- Anatomical Landmarks: The provided image appears to display the cranial structures. [Specific regions, if identifiable, should be mentioned. For example: The lateral ventricles, third ventricle, thalami, etc.]
- Cortical Folding: Based on the provided image, a detailed assessment of cortical folding is challenging without more context and additional views.
- Midline Structures: Evaluation for midline shift or other midline abnormalities would require multiple views and a comprehensive assessment by a trained radiologist.
- Ventricles: The lateral ventricles appear [normal/enlarged/etc.] in size. [Comment on other findings related to ventricles if visible.]
- Additional Observations: [Any other noticeable features or abnormalities.]

Impression:

The provided single-view ultrasound of the brain is limited in its scope. No definitive abnormalities are immediately evident in the provided image, but a comprehensive evaluation by a trained radiologist, considering the clinical context, is essential for a conclusive report. Please note that this is a very general template and lacks specificity. In a real clinical setting, a detailed and accurate interpretation would be provided by a board-certified radiologist who would have access to multiple views, patient history, and other relevant clinical information. If this is for a real patient, it's crucial to consult with a medical professional.

Reference answer

There is bilateral germinal matrix hemorrhage that extends into the parenchyma and dilated ventricles (grade IV). Right anterior horn ventricle craniocaudal dimension; 10 mm on the right and 10 mm on the left. Grey-white matter differentiation is preserved. Cortical folding is appropriate for age. Normal echogenicity and homogeneity of subcortical white matter. Thalami and basal ganglia are normal. The width of the subarachnoid spaces are appropriate for age. No midline shift.

Figure 9 | Central Nervous System: Case 4. From the generated report, we can see GPT-4V fails to identify key diagnosis evidence and can't draw a concrete impression. It further proves the poor performance of GPT-4V on rare image modalities in central nervous system examinations. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/grade-iv-germinal-matrix-haemorrhage-with-periventricular-leukomalacia?lang=us>.

Central Nervous System: Case 5

Prompt

What is the diagnosis of this image?

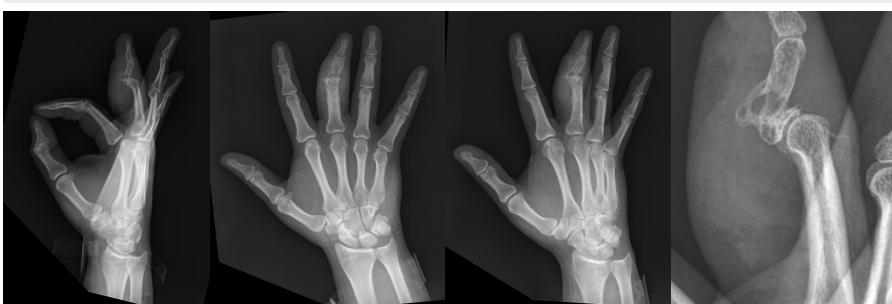


GPT-4V

The image appears to be an X-ray of a hand. However, I am not a radiologist or medical professional, and diagnosing medical images requires specialized expertise. If you or someone you know has concerns about a medical condition, please consult with a healthcare professional. They will be able to provide an accurate diagnosis and appropriate recommendations.

Prompt

What is the diagnosis of these four images?



GPT-4V

These images appear to be X-rays of hands. Please note that I'm not a medical professional. If you have concerns or questions about these images, you should consult with a medical professional or radiologist for a thorough evaluation. How can I assist you further?

Reference answer

Right middle finger:

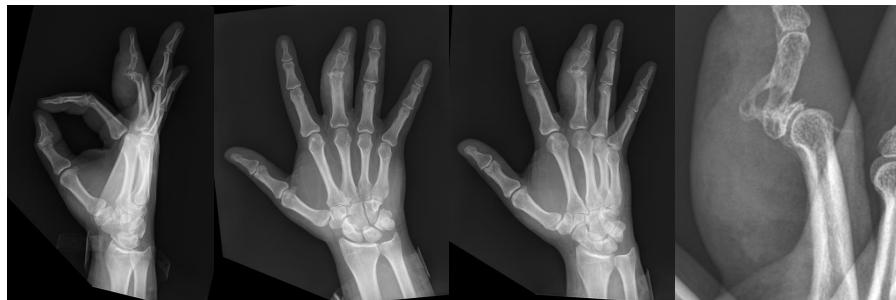
- soft-tissue swelling
- deformity of the middle phalanx and PIP joint: possible old pathological fracture
- circumscribed lytic areas in the expanded proximal middle phalanx.

Figure 10 | Central Nervous System: Case 5. This case shows several fracture X-ray hand scans. GPT-4V also fails to draw any useful conclusions like in Case 4. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/disseminated-tuberculosis-10?lang=us>.

Central Nervous System: Diagnosis Case 5 cont.

Prompt

Can you write a report for these four images?



GPT-4V

X-ray Report: Hand Images

Patient: [Not provided]

Date: [Not provided]

Findings:

1. Bone Integrity:

- The bones in the presented X-ray images of the hands appear to have normal cortical thickness and trabecular pattern. There are no obvious fractures, lytic lesions, or sclerotic changes.

2. Joint Spaces:

- The joint spaces in both hands seem to be well-maintained. No significant joint space narrowing or signs of osteoarthritis are evident.

3. Soft Tissues:

- Soft tissues around the hand bones look unremarkable with no apparent swelling or masses.

4. Foreign Bodies:

- No foreign bodies or implants are visible in the presented images.

5. Alignment:

- The phalanges, metacarpals, and carpal bones all appear to be in proper alignment.

6. Other Observations:

- There are no visible signs of any calcifications, bone spurs, or cystic changes.

- The sesamoid bones appear normal.

Impression:

The X-ray images of both hands appear to be within normal limits. No acute osseous abnormalities are identified.

Recommendations:

No further imaging is recommended based on the presented images. However, if the patient has specific symptoms or concerns, a clinical examination would be necessary.

Note:

This report is a general overview based on the images provided. It is essential to consult with a radiologist or an appropriate healthcare professional for a comprehensive analysis.

Reference answer

Right middle finger:

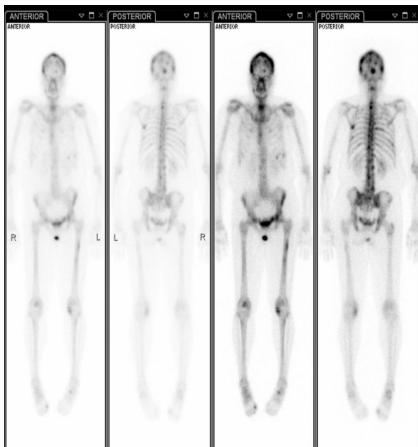
- soft-tissue swelling
- deformity of the middle phalanx and PIP joint: possible old pathological fracture
- circumscribed lytic areas in the expanded proximal middle phalanx.

Figure 11 | Central Nervous System: Case 5. GPT-4V derives wrong findings for the hand X-ray scans. This case also proves GPT-4V may have poor performance on rare image modalities in central nervous system examinations. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/disseminated-tuberculosis-10?lang=us>.

Central Nervous System: Case 6

Prompt

What is the diagnosis of this nuclear medicine imaging?



GPT-4V

The image you've provided appears to be a whole-body scintigraphy, possibly a bone scan, based on the visualization of the skeleton. Interpreting nuclear medicine images requires expertise, and a thorough understanding of the clinical context and history of the patient. A few general observations can be made from bone scans:

1. Hot Spots (areas of increased uptake): These could suggest areas of increased bone turnover, which could be due to fractures, tumors, infections, arthritis, etc.
2. Cold Spots (areas of decreased uptake): These could suggest areas with decreased blood flow or bone turnover, such as certain types of tumors or avascular necrosis.

However, I cannot make a definitive diagnosis based on this image alone. It's important to consult with a nuclear medicine physician or radiologist for an accurate interpretation and diagnosis.

Prompt

What is the purpose of the bone scan?

GPT-4V

A bone scan, such as the one provided in the image, is a nuclear medicine imaging test that uses a small amount of radioactive material to help diagnose and evaluate various bone diseases and conditions. The purpose of a bone scan can be varied, depending on the clinical context. Here are the primary reasons a bone scan might be ordered:

1. **Detecting Bone Metastases:** Bone scans are frequently used to detect metastatic cancer. Certain cancers, such as prostate and breast cancer, often metastasize to bones.
2. **Identifying Bone Infections:** The scan can help identify osteomyelitis, an infection of the bone.
3. **Evaluating Unexplained Bone Pain:** If a patient is experiencing localized bone pain without a known cause, a bone scan can help in identifying potential reasons.
4. **Assessing Bone Fractures:** Some fractures, especially those that are stress or hairline fractures, might not be immediately evident on conventional X-rays. A bone scan can help detect such fractures.
5. **Monitoring Conditions:** Conditions such as Paget's disease of the bone or other bone disorders can be monitored using bone scans.
6. **Evaluating Joint Disorders:** The scan can be used to diagnose certain conditions affecting joints, such as osteoarthritis.

Reference answer

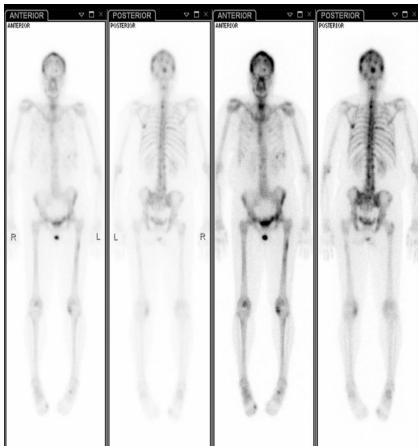
To detect skeletal metastasis.

Figure 12 | Central Nervous System: Case 6. This case shows a nuclear medicine image of skeletal metastasis and GPT-4V can't draw concrete diagnosis for the image. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/skull-metastasis-2?lang=us>.

Central Nervous System: Case 6 cont.

Prompt

Which parts of the skeleton are affected in this case according to the bone scan?



GPT-4V

Based on the bone scan you provided, areas with increased uptake (often referred to as "hot spots") can be indicative of increased bone metabolism or activity, which might be seen in conditions such as fractures, infections, tumors, or metabolic disorders. From the images, it appears there is increased uptake in:

1. The left **hip/pelvic** region.
2. The region around the right.

Reference answer

The **calvarial bones**, **ribs**, **spinal vertebrae**, **scapula**, **pelvic** bones, and **femora**.

Prompt

Generate a radiology report for this nuclear medicine imaging.

GPT-4V

Patient: [Patient Name]

Study: Whole Body Bone Scan

Technique: Anterior and posterior whole body images were obtained after intravenous administration of a technetium-99m labeled diphosphonate.

Findings:

1. There is focal increased radiotracer uptake noted in the left **hip/pelvic** region. **This could be secondary to a variety of etiologies including metastasis, fracture, osteoarthritis, or infection.** Clinical correlation and further targeted imaging such as MRI or X-ray might be helpful.
2. Another focal area of increased uptake is seen around the right knee, which may be indicative of a localized process such as arthritis, a healing fracture, or other pathologies.
3. The rest of the visualized skeletal system appears to have homogenous radiotracer distribution with no other abnormal focal increased or decreased uptake.

Impression:

- Focal increased radiotracer uptake in the left hip/pelvic region. Further evaluation with targeted imaging is recommended.
- Increased uptake in the region around the right knee suggestive of a localized pathology. Further clinical correlation is advised.

Reference answer

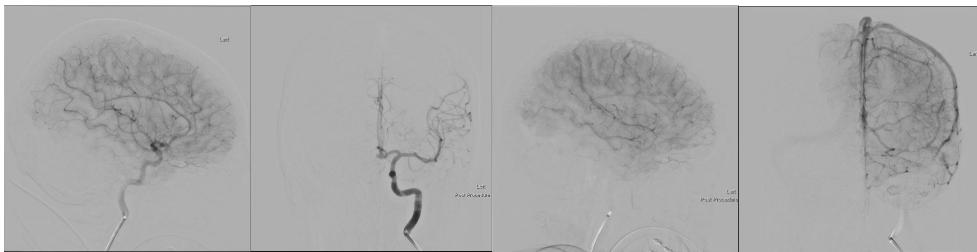
Areas of increased radiotracer uptake are noted involving the **calvarial bones**, **ribs**, **spinal vertebrae**, **scapula**, **pelvic** bones, and **femora** on bone scan suggestive of **skeletal metastasis**.

Figure 13 | Central Nervous System: Case 6. GPT-4V can localize some infected areas and give multiple possible diagnosis including the right answer. It shows GPT-4V have some basic medical knowledge but not enough to fulfill a complex task. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/skull-metastasis-2?lang=us>.

Central Nervous System: Case 7

Prompt

What is the diagnosis of these four images?



GPT-4V

The images, please consult with a medical professional or a radiologist who can provide a detailed interpretation. The images provided are angiograms, which are medical images that visualize blood vessels using contrast agents. These specific images seem to depict cerebral vessels in the brain, likely obtained during a cerebral angiography. The objective of such imaging is usually to investigate vascular conditions in the brain such as aneurysms, stenoses, or vascular malformations.

From the images, it's evident that there are vascular structures with some differences between the "pre-procedure" and "post-procedure" images, but without specific clinical context, it's hard to interpret the exact nature of the findings or the procedures performed. If you have concerns or questions about these

Prompt

Please give a report of these four images.

GPT-4V

Certainly, please note that I am not a medical professional, but based on my training data, I can provide a general interpretation of the angiographic images you've presented:

Image 1:

- View: Lateral view of the left cerebral hemisphere.
- Observation: The image displays a detailed view of the left cerebral vasculature. There appears to be a dense vascular network with an area of increased complexity which might indicate a vascular malformation, but this needs to be confirmed with a radiologist.

Image 2:

- View: Anteroposterior (AP) view of the left cerebral hemisphere.
- Observation: This view gives an overview of the vasculature branching out in the brain. There's a distinct main vessel, possibly the left middle cerebral artery, branching out into numerous smaller vessels. No immediate anomalies are discerned, but subtle findings may require a trained eye.

Image 3:

- View: Lateral view of the left cerebral hemisphere post-procedure.
- Observation: The vascular structure appears similar to the first image. However, this being a post-procedure image, changes in flow dynamics or interventions such as coil placements or other treatments could be of interest. No obvious coils or clips are visible, but a detailed comparison with the pre-procedure image is essential.

Image 4:

- View: Close-up lateral view of the left cerebral hemisphere post-procedure.
- Observation: This close-up view shows a dense vascular network. It's not immediately clear what changes have occurred post-procedure, but a side-by-side comparison with the first image might provide insights into any interventions or changes in vascular architecture.

It's imperative to consult with a radiologist or a neurointerventionalist for a precise and clinically relevant interpretation of these images.

Reference answer

The post-stenting DSA shows occlusion of a small anterior branch of the left ACA, the orbitofrontal artery.

Figure 14 | Central Nervous System: Case 7. This case shows a ACA orbitofrontal infarct post DSA image. GPT-4V can't precisely recognize the image view and can't draw a concrete and precise conclusion. It shows GPT-4V perform worse on the rare image modalities compared to the common image modalities in central nervous system examinations (Case 4, 5, 6, 7 v.s Case 2, 3). The original Radiopaedia case can be found in <https://radiopaedia.org//cases/aca-orbitofrontal-infarct-post-dsa?lang=us>. 31

Head and Neck: Case 1

Prompt

Please give a diagnosis of this image.



GPT-4V

I'm not a medical professional, but the image appears to be an **ultrasound** scan. It's important to consult with a qualified medical professional or radiologist to get a proper diagnosis and interpretation of any medical imaging.

Reference answer

Enlarged 24 mm node in right level, with loss of normal hilar architecture and with heterogeneous cortical echotexture. Further mass at right parotid tail with similar US characteristics (13 mm). No contralateral nodes visible on US. 18 G core biopsy of the right level 4 node performed.

Prompt

Is the echotexture of the node homogeneous or heterogeneous?

GPT-4V

The image appears to show an **ultrasound** scan, and from the provided image, the echotexture of the node seems **heterogeneous**. There are varying echogenicities within the structure, suggesting a mix of different tissue types or densities. However, please note that interpreting medical images requires clinical expertise, and it's crucial to consult with a radiologist or relevant medical professional for a definitive diagnosis.

Reference answer

The cortical echotexture of the node is **heterogeneous**.

Prompt

Is there a mass visible at a specific location?

GPT-4V

This appears to be an **ultrasound** image. While I can attempt to provide a general description based on the image's visual characteristics, it's crucial to note that a definitive interpretation, especially regarding medical conditions, should be made by a qualified medical professional. Upon examination, I do see several **hypoechoic** (darker) and **hyperechoic** (brighter) areas within the image. If you are referring to a particular **hypoechoic** region as a potential "mass", there is a noticeable darkened region in the center of the image. However, please consult with a radiologist or relevant medical professional to obtain an accurate interpretation of this ultrasound image.

Reference answer

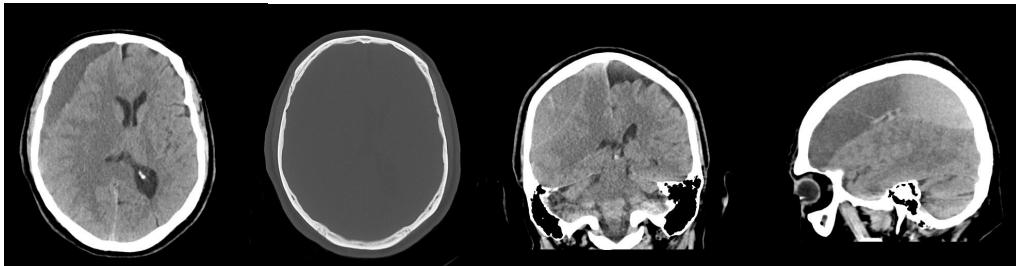
Yes, there is a mass at the right parotid tail.

Figure 15 | Head and Neck: Case 1. This case shows a supraclavicular metastatic lung adenocarcinoma ultrasound image. GPT-4V precisely identifies the image modality but can't give any direct diagnosis. Under some instructions it successfully recognizes the heterogeneous node and abnormal intensities in the image. This case shows GPT-4V can perform better when giving more instructions in prompt. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/supraclavicular-metastatic-lung-adenocarcinoma?lang=us>.

Head and Neck: Case 2

Prompt

Please give a diagnosis of these four images.



GPT-4V

I'm not a medical professional, but based on the images you provided, they appear to be CT (computed tomography) scans of the head.

- The first image shows a cross-sectional view of the brain. **There seems to be a darkened, asymmetrical region on one side of the brain, which could suggest a potential abnormality or pathology.**
- The second image is more difficult to interpret without context, as it mostly appears as a uniform shade throughout.
- The third and fourth images appear to provide a **coronal** view (front to back) and a **sagittal** view (side to side), respectively, of the brain. Like the first image, there are some darkened regions, but without clinical context, it's hard to provide a specific diagnosis.

If these images are related to a real medical concern, it's essential to consult with a radiologist or another medical professional to obtain a proper diagnosis. They have the expertise to interpret these scans and provide medical advice.

Reference answer

There is a mixed density holohemispheric subdural hematoma on the right. There is resultant effacement of the subjacent sulci and right lateral ventricle. There is a leftward midline shift.

Prompt

What is the condition of midline position of the brain?

GPT-4V

The images you've provided appear to be CT scans of the head. Based on the images:

1. **There seems to be a shift of the midline structures away from the left side**, suggesting some mass effect on the brain, likely due to the hyperdense (whiter) lesion seen on the left side of the images (right side of the patient).
 2. This lesion could represent a hematoma (blood accumulation), tumor, or other mass lesion causing the midline shift.
 3. The ventricles (fluid-filled spaces in the brain) seem compressed, especially on the side of the lesion.
- A midline shift in the brain can be a serious condition as it might compress vital structures. It's crucial for a radiologist or a neurologist to evaluate these images in person for a definitive diagnosis and appropriate management. If this is a medical situation, please seek immediate attention from a healthcare professional.

Reference answer

The midline is shifted leftward.

Figure 16 | Head and Neck: Case 2. This case shows several subdural hematoma brain CT images. GPT-4V precisely identifies the modality and plane of the image, determines the abnormal intensities and the midline is shifted leftward. But it fails to give the concrete and precise diagnosis. This case shows that GPT-4V have basic medical knowledge but fails to draw accurate diagnosis. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/subdural-hematoma-14?lang=us>.

Head and Neck: Case 3

Prompt

Please diagnose this image.



GPT-4V

I am not a medical professional, but this image appears to be a panoramic dental radiograph (also known as a panoramic x-ray or OPG). From the image, I can make a few general observations:

1. There are several dental restorations (fillings or crowns) visible.
2. Some teeth have been extracted, as there are gaps present.
3. The image shows a couple of dental implants – those are the metal posts that replace the root of a missing tooth.
4. The lower right side (labeled "R" on the image) appears to show an impacted tooth or a tooth that hasn't fully erupted.

However, it's essential to consult with a dentist or an oral and maxillofacial radiologist for a comprehensive evaluation and accurate diagnosis. They will be able to provide a detailed assessment and recommend any necessary treatments.

Prompt

This patient has pain with a lump in the floor of the mouth, please give a diagnosis according to this image of his teeth.

GPT-4V

I am not a medical professional, but the image you provided appears to be an orthopantomogram (OPG) or panoramic X-ray of the jaws. Based on the information and the image, there are several potential diagnoses that can be considered for a patient with pain and a lump in the floor of the mouth:

1. **Dental abscess:** This is an infection that originates from a tooth. It can spread to surrounding tissues and cause pain and swelling.
2. **Salivary gland disorders:** These can manifest as lumps or swelling in the floor of the mouth. Examples include sialolithiasis (stones in the salivary gland ducts) and sialadenitis (inflammation of the salivary glands).
3. **Ranula:** A ranula is a mucus-filled cyst that can appear in the floor of the mouth due to blockage or damage to a salivary gland.
4. **Tumors or growths:** Both benign and malignant tumors can present as lumps in the floor of the mouth.

It's essential for the patient to consult with a dentist or oral surgeon to get a proper diagnosis. They will be able to take a comprehensive history, perform a physical examination, and may order further tests if necessary.

Reference answer

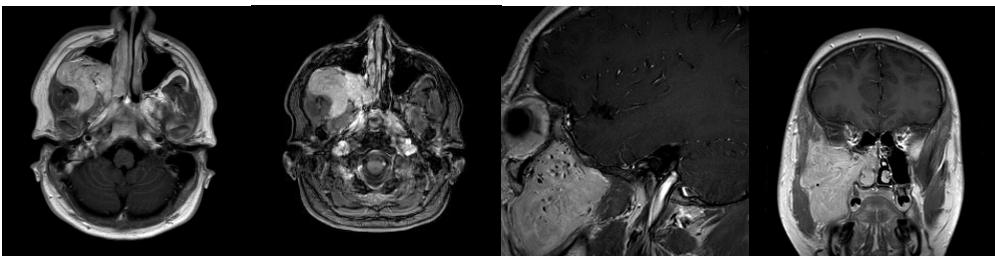
Left-sided well-margined osteolytic lesion within the horizontal branch of the mandible with floating teeth aspect (teeth number 34 and 35).

Figure 17 | Head and Neck: Case 3. This case shows a floating teeth X-ray image. GPT-4V fails to identify the image content. This shows GPT-4V can perform poorly on rare image modalities and rare anatomy of head and neck checks. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/floating-teeth-2?lang=us>.

Head and Neck: Case 4

Prompt

Please give a radiology report of this patient.



GPT-4V

1. Axial T2-weighted image (Top Left):
 - The image provides a cross-sectional view of the brain at the level of the eyes and the midbrain.
 - The ventricles and sulci appear symmetrical, with no obvious expansion or compression.
 - There are no apparent masses, cysts, or lesions in the visible brain tissue.
2. Sagittal T1-weighted image (Bottom Left):
 - The image provides a side view of the head, capturing the nasal cavity to the back of the skull.
 - The cerebellum, brainstem, and spinal cord appear intact without visible compression or abnormal masses.
 - The cerebral falx is visible and appears normal.
3. Coronal T1-weighted image (Bottom Right):
 - The image provides a frontal view of the brain.
 - The bilateral structures such as the lateral ventricles and basal ganglia appear symmetrical.
4. No obvious abnormalities or lesions are visible in this slice.

Prompt

Patient reports fullness in his right cheek. Note a progressively enlarging and painful right-sided buccal mass. Please give a radiology report of this patient based on the given images.

GPT-4V

MRI Findings:

1. Axial T2-weighted Image:
 - There is a well-defined, hyperintense lesion in the right buccal region. The lesion is compressing adjacent structures but there seems to be no overt invasion.
2. Sagittal T1-weighted Image:
 - The lesion is isointense to muscle on T1-weighted images.
 - There's no obvious fat suppression or hyperintensity that would suggest a lipoma.
 - The mass seems to be displacing surrounding structures but does not show clear signs of infiltrating them.
3. Coronal T2-weighted Image:
 - The hyperintense mass in the right buccal region is even more clearly visualized in this view.
 - The mass seems to be separate from the parotid gland, suggesting it might not be of parotid origin.

Impression:

- The imaging findings are suggestive of a cystic or fluid-filled lesion in the right buccal space. The differential diagnosis includes buccal space abscess, benign cystic lesion such as a dermoid or epidermoid cyst, or possibly a benign salivary gland tumor such as a mucocoele or pleomorphic adenoma. Given the progressive and painful nature of the swelling, an infectious or inflammatory cause, such as an abscess, should be high on the differential.

Reference answer

Juvenile nasopharyngeal angiofibroma. There is an avidly enhancing soft tissue mass with increased flow voids originating within the sphenopalatine foramen. There is widening of the pterygopalatine foramen and pterygomaxillary fissure. There is a large component within the right masticator space extending anteriorly and laterally into the right buccal space. The pterygoid musculature is displaced posteriorly. There is mass effect upon the right maxillary sinus with anterior bowing of the posterior wall and bony remodeling, without invasion into maxillary sinus. A small component of the mass is present within the right nasal cavity and right sphenoid sinus. There is widening of the right inferior orbital fissure, without evidence of involvement of the orbital apex. No evidence of mandibular invasion or intracranial extension is identified.

Head and Neck: Case 5

Prompt

Please give a radiology report of this patient.



GPT-4V

I'm not a radiologist, but based on the images you provided, they appear to be angiograms or similar medical images that visualize blood vessels. In an angiogram, a contrast dye is injected into the blood vessels and then X-ray images are taken to visualize the flow of the dye through the vessels. General observations:

1. There seem to be areas of dense concentrations, possibly indicating a cluster of vessels or abnormalities.
2. There are certain sections where the vessels appear to be more dilated or tortuous.

However, without proper clinical context and a trained radiologist's review, it's impossible to make a definitive diagnosis. If these are actual medical images, it's crucial to have them evaluated by a medical professional in a clinical setting.

Prompt

Patient reports fullness in his right cheek. Note a progressively enlarging and painful right-sided buccal mass. Please give a radiology report of this patient based on the given images.

GPT-4V

I am not a radiologist, but based on the provided images, they appear to be **angiograms of blood vessels**. The images seem to show some sort of **vascular anomaly or abnormality**, which could be the cause of the patient's symptoms. Here's a general description:

Preliminary Observations (please consult a radiologist for a detailed analysis):

1. There's an area of **complex vascular structures with increased density**, suggesting **an arteriovenous malformation or another type of vascular malformation**.
2. **The tangle of blood vessels appears to be highly concentrated and intertwined**, possibly indicating **nidus formation**.
3. **There are some enlarged feeding arteries leading to the area of abnormality**.
4. **The venous drainage appears to be prominent**, suggesting **high flow**.

Impression:

The images suggest a **vascular anomaly**, possibly an **arteriovenous malformation**, in **the right buccal region**. This could be the cause of the patient's symptoms of fullness and pain.

Recommendation:

The patient should be evaluated by an interventional radiologist or vascular surgeon for a detailed assessment and possible treatment options. It would also be crucial to obtain a formal radiology report from a certified radiologist to confirm these findings and determine the best course of action.

Reference answer

The angiogram demonstrates a large **tumor blush** on the **right side** with **predominant supply from the external carotid artery**, particularly from the **maxillary artery** and the **middle meningeal artery**.

Figure 19 | Head and Neck: Case 5. This case shows the DSA images for juvenile nasopharyngeal angiofibroma. GPT-4V identifies the image modality but fail to give diagnosis without giving patient history. When giving patient history, GPT-4V reflects more observations about abnormal parts. This also shows adding patient history to the prompt can improve the performance to a certain extent. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/juvenile-nasopharyngeal-angiofibroma-19?lang=us>.

Cardiac: Case 1

Prompt

Please generate a structural report according to these images.



GPT-4V

Findings:

1. Lungs and Pleura:

Both lungs show clear and well-inflated lung fields without obvious consolidation, mass, or pleural effusion.
No visible pneumothorax.

2. Cardiomediastinal Contour:

The mediastinal and cardiac contours appear within normal limits.

3. Bones and Soft Tissue:

Visualized osseous structures of the chest show no obvious fractures or lytic lesions.
The soft tissues are unremarkable.

4. Other Observations:

The provided images are slightly rotated as evidenced by the misalignment of the vertebral spinous processes with respect to the trachea. This may affect the accurate assessment of the cardiac size and mediastinal structures.

Impression:

- No acute cardiopulmonary abnormality detected on the provided images.
- Consider clinical correlation.

Reference answer

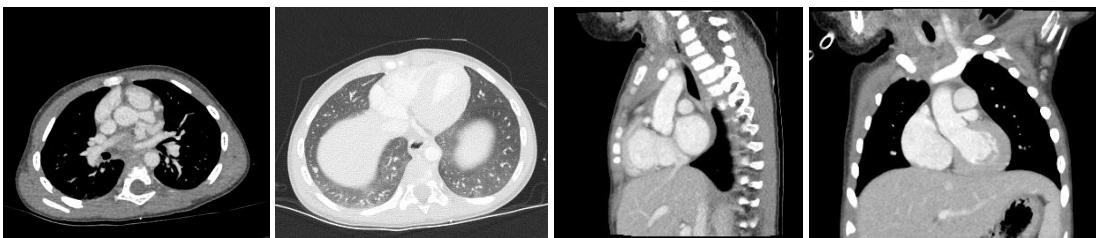
1. Mild diffuse cardiomegaly with mild central pulmonary vascular congestion in this patient with sickle cell disease.
2. Mild diffuse bilateral bronchial wall thickening may be due to reactive airway disease or a chronic finding. Minimal fibro-atelectasis in the right mid lung zone. No focal pneumonia, effusion or pneumothorax. Lungs otherwise clear.
3. Mild anterior wedging and biconcavity of some thoracic vertebral bodies, mild diffuse endplate sclerosis and H shaped configuration of the lower-thoracic vertebral bodies on frontal projection.
4. Diffuse splenomegaly in the upper abdomen best evident on the lateral view.

Figure 20 | Cardiac: Case 1. This case shows a X-ray modality report generation example of pediatric sickle cell anemia. GPT-4V shows a tendency of hallucination that each part is normal. <https://radiopaedia.org//cases/pediatric-sickle-cell-anemia?lang=us>.

Cardiac: Case 2

Prompt

Is there any coronary anomaly according to the images?



GPT-4V

The first two images appear to be axial CT slices of the chest, showing portions of the heart and lungs. I can observe the cardiac chambers and some of the main coronary arteries, but the limited view and resolution make it challenging to conclusively identify anomalies.

The third and fourth images appear to be sagittal reconstructions of a chest CT. They provide a view of the heart from the side, including portions of the aorta and other major vessels.

Reference answer

The coronary arteries arise from the expected coronary sinuses without coronary anomaly.

Prompt

Which kind of disease may these images point to?

GPT-4V

Some possible conditions or diseases, given these observations, could include:

- Cardiomyopathies (such as dilated cardiomyopathy)
- Vascular aneurysms (like aortic aneurysm)
- Congenital heart or vascular abnormalities
- Acquired coronary artery disease or anomalies

Reference answer

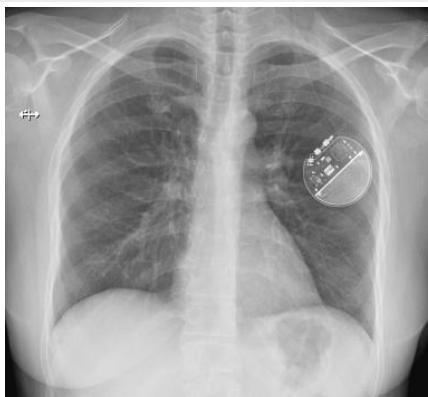
Kawasaki disease

Figure 21 | Cardiac: Case 2. This case shows a CT modality VQA example of Kawasaki disease. GPT4V shows strong conservatism for diagnosis task. <https://radiopaedia.org//cases/kawasaki-disease-2?lang=us>.

Cardiac: Case 3

Prompt

According to these images, Is there any medical device present?



GPT-4V

Yes, there appears to be a medical device present in the second image, specifically a cardiac device, which looks like a pacemaker or implantable cardioverter-defibrillator (ICD) positioned in the upper left chest region. The first image does not seem to have any visible medical device. Always consult with a professional radiologist for a definitive interpretation.

Reference answer

Vagal nerve stimulator

Prompt

Where is this device located?

GPT-4V

The device, which appears to be a cardiac device (e.g., a pacemaker or implantable cardioverter-defibrillator), is located in the upper left chest region, just below the clavicle and near the heart.

Reference answer

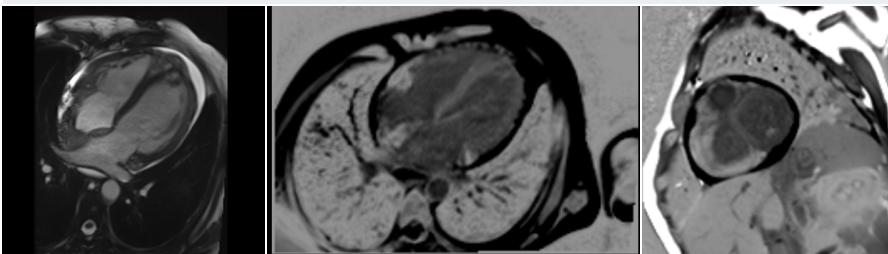
Located in the upper left thoracic chamber

Figure 22 | Cardiac: Case 3. this case shows a X-ray modality VQA example of vagal nerve stimulator. In this case, GPT-4V demonstrates high sensitivity to medical devices. <https://radiopaedia.org//cases/vagal-nerve-stimulator-9?lang=us>.

Cardiac: Case 4

Prompt

Please generate a structural report according to these images.



GPT-4V

Cardiac MRI Structural Report:

Image 1 (Axial Plane):

Left ventricle (LV) appears to have a normal cavity size.

Right ventricle (RV) also appears within normal limits regarding size.

No obvious focal wall motion abnormalities seen in the axial slice provided.

Pericardium appears intact with no obvious pericardial effusion.

Image 2 (Coronal Plane):

The myocardium of both LV and RV appears to have uniform thickness.

No signs of outflow tract obstructions or abnormalities.

No obvious masses or thrombi visualized in the chambers.

Image 3 (Sagittal Plane):

Atrioventricular and interventricular septa appear intact without visible defects.

Pulmonary veins and superior vena cava can be visualized entering the left and right atria, respectively, with no obvious abnormalities.

No signs of valvular abnormalities or vegetations in this plane.

Recommendation: For a comprehensive assessment and diagnosis, please have these images reviewed by a board-certified radiologist or cardiologist who can interpret them in the context of the clinical scenario and provide a more accurate and detailed report.

Note: This analysis is based on the quality and slices of the images provided and may not capture all potential abnormalities or provide a complete assessment of cardiac anatomy and function.

Reference answer

Diffuse thickening of myocardium of right atrium, right ventricle and right AV groove showing late gadolinium enhancement.

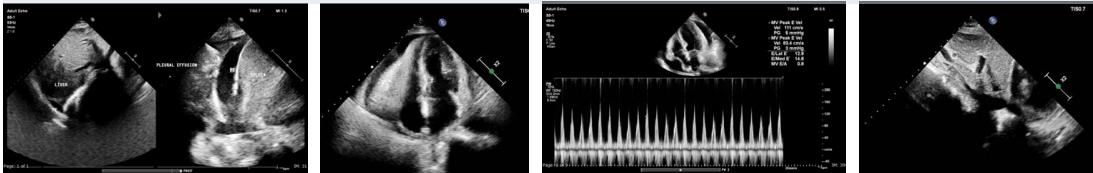
Small pericardial effusion.

Figure 23 | Cardiac: Case 4. This case shows a MRI modality report generation example of Erdheim-Chester disease. GPT-4V demonstrates an accurate determination of image modality in detail, but fails to determine pathological features. <https://radiopaedia.org//cases/erdheim-chester-disease-13?lang=us>.

Cardiac: Case 5

Prompt

Please generate a structural report according to these images.



GPT-4V

Findings:

Image 1:

Liver: The liver parenchyma appears echogenic without focal lesions. The liver margins are smooth.

Free Fluid (FF): An anechoic area adjacent to the liver indicates the presence of free fluid, suggestive of ascites.

Pleural Effusion: An anechoic area is seen in the thoracic region, suggesting the presence of a pleural effusion.

Spleen: The spleen is visualized, and its echotexture appears homogenous. No focal lesions are seen.

Image 2:

Cardiac Image: The image shows a section of the heart, though specific cardiac chambers are not labeled. The myocardial walls appear of normal thickness without any overt hypokinetic or hyperkinetic areas. Further detailed assessment would require more labeled images or video clips.

Image 3:

Cardiac Doppler Waveforms: This image depicts Doppler waveforms, likely from the mitral valve (given the labels of MV Peak E Vel, etc.).

E wave peak velocity: 111 cm/s

A wave peak velocity (not clearly depicted in this image)

E/A ratio: 0.8 (this value suggests a diastolic function abnormality, but a comprehensive evaluation would be needed for an accurate assessment)

E/E' ratio is given, suggesting an assessment of left ventricular filling pressures. The values provided (E/Lat E', E/Med E') are parameters used to evaluate diastolic function and left atrial pressure. The specific values need clinical correlation.

Image 4:

Tissue/Organ Not Specified: The image shows a sonographic view of an organ/tissue, but it's unclear which specific organ or structure is being visualized without labeling or context. Echotexture appears heterogeneous.

Impression:

Evidence of free fluid, suggestive of ascites.

Evidence of pleural effusion.

Doppler findings from the cardiac image suggest potential diastolic dysfunction, but a comprehensive cardiac evaluation is necessary for an accurate diagnosis.

Reference answer

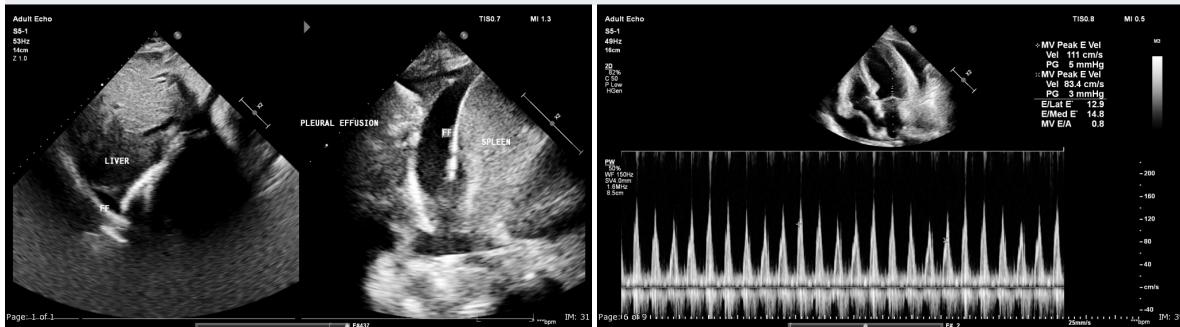
Moderate circumferential pericardial effusion measuring 1.4cm in diastole. Mild bilateral pleural effusion left more than right. There is right ventricular outflow tract diastolic collapse and right atrial systolic collapse. No abnormal respiratory variations of transmural flow. Normal inferior vena cava with more than 50% inspiratory collapse. Normal left ventricular systolic function.

Figure 24 | Cardiac: Case 5. This case shows an ultrasound modality report generation example of pericardial effusion. GPT-4V shows satisfying abilities to understand ultrasound images. <https://radiopaedia.org//cases/pericardial-effusion-35?lang=us>.

Cardiac: Case 5 cont.

Prompt

Please generate a structural report according to these images.



GPT-4V

Image 1 (Echocardiogram):

Modality: Echocardiography (Adult Echo)

View: Parasternal short axis and pulsed wave Doppler of mitral inflow

Observations:

Two-dimensional echocardiogram shows the left ventricular chamber. The myocardium appears to be of normal thickness without any obvious regional wall motion abnormalities visible in this particular view.

The Doppler image below shows the mitral inflow pattern with E and A waves. The values provided suggest:

MV Peak E Velocity: 111 cm/s

MV Peak A Velocity: 83.4 cm/s

E/A ratio is approximately 1.3, which is within the normal range for many adults.

E/Lat E': 12.9 and E/Med E': 14.8 indicating the diastolic function of the heart.

No valvular regurgitation or stenosis is evident in this view.

Image 2 (Abdominal Ultrasound):

Modality: Ultrasonography (Adult Echo)

View: Likely a subcostal or intercostal view, given the visualization of liver, spleen, and possible pleural effusion.

Observations:

The liver parenchyma appears echogenic without any obvious focal lesions in this view.

There's a fluid collection (labeled as "FF") adjacent to the liver, which could represent free fluid or ascites.

The spleen appears to be of normal size and echotexture. No focal lesions are visible.

A fluid collection, labeled as "PLEURAL EFFUSION", is seen adjacent to the spleen, indicating the presence of fluid in the pleural space.

Reference answer

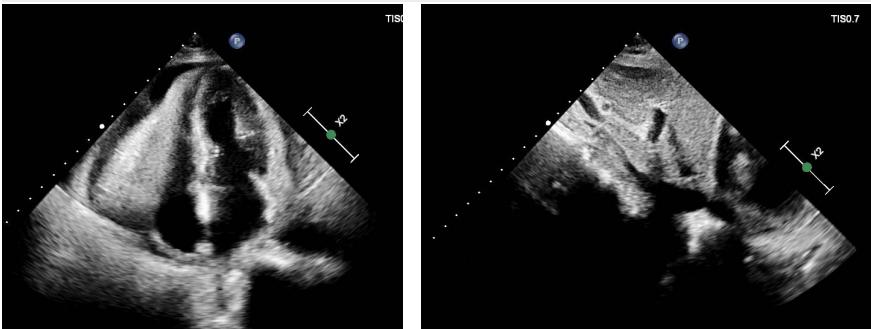
Moderate circumferential pericardial effusion measuring 1.4cm in diastole. Mild bilateral pleural effusion left more than right. There is right ventricular outflow tract diastolic collapse and right atrial systolic collapse. No abnormal respiratory variations of transmural flow. Normal inferior vena cava with more than 50% inspiratory collapse. Normal left ventricular systolic function.

Figure 25 | Cardiac: Case 5 cont. This case shows an ultrasound modality report generation example of Pericardial effusion, Ultrasound. Compared with Case5, GPT-4V shows some recognition ability of text and numerical results in ultrasound images, but worse understanding of images. <https://radiopaedia.org/cases/pericardial-effusion-35?lang=us>.

Cardiac: Case 5 cont.

Prompt

Please generate a structural report according to these images.



GPT-4V

Image 1 (Echocardiogram):

Modality: Echocardiography

View: Apical four-chamber (A4C) view

Observations:

The image displays both the left and right chambers of the heart.

The left ventricle (LV) and the left atrium (LA) are visualized on one side, while the right ventricle (RV) and the right atrium (RA) are on the opposite side.

The myocardium of the LV appears intact without evident wall motion abnormalities in this view.

The interventricular septum appears intact without any evident defects.

The cardiac chambers appear to be of normal size without evidence of dilation.

The atrioventricular valves (mitral and tricuspid) appear structurally normal in this view.

Image 2 (Ultrasonogram):

Modality: Ultrasonography

View: Appears to be an abdominal or possibly pleural view, but exact orientation is challenging to discern without clinical context.

Observations:

The image displays a heterogeneous structure, which could be liver, spleen, or another organ, but it's difficult to specify without additional views or clinical context.

There are no obvious focal lesions in the displayed region.

The echotexture appears heterogeneous but without clear context on the specific organ or structure being visualized, specific conclusions are challenging.

Reference answer

Moderate circumferential pericardial effusion measuring 1.4cm in diastole. Mild bilateral pleural effusion left more than right. There is right ventricular outflow tract diastolic collapse and right atrial systolic collapse. No abnormal respiratory variations of transmural flow. Normal inferior vena cava with more than 50% inspiratory collapse. Normal left ventricular systolic function.

Figure 26 | Cardiac: Case 5 cont. This case shows an ultrasound modality report generation example of pericardial effusion. Compared with Case5, no captioned ultrasound images are provided, GPT-4V shows poor ability to recognize images. <https://radiopaedia.org//cases/pericardial-effusion-35?lang=us>.

Cardiac: Case 6

Prompt

These images are known to have been taken of the same patient at the same part of body. Generally looking at these images, does the pulmonary artery has any signs of abnormal enlargement?



GPT-4V

The pulmonary artery typically branches off from the main pulmonary trunk, leading into the left and right pulmonary arteries, which then carry deoxygenated blood from the heart to the lungs.

From the images:

The first image appears to be a lateral chest X-ray. The pulmonary arteries aren't as distinctly visualized on standard X-rays as they are on more specialized imaging. However, no overt enlargement of the pulmonary artery or associated structures is evident from this view.

The second image seems to be an axial cut from a chest CT or MRI. While the cross-sectional views can provide detailed images of the vessels, including the pulmonary artery, the specific section provided does not give a complete view of the pulmonary artery's full extent.

The third image is a standard anterior-posterior (AP) or postero-anterior (PA) chest X-ray. Again, while the major vessels can be seen, without a direct comparison to the patient's previous images or standard measurements, it's challenging to definitively comment on the size of the pulmonary artery.

From a general standpoint, no overt enlargement of the pulmonary artery is evident in these images.

Reference answer

Massively enlarged main pulmonary artery

Figure 27 | Cardiac: Case 6. This case shows a X-ray & MRI modalities combined modality VQA example of Pulmonic stenosis. GPT-4V does not demonstrate augmented ability in the case of mixed mode inputs. <https://radiopaedia.org//cases/pulmonic-stenosis-1?lang=us>.

Chest: Case 1

Prompt

The images are sagittal STIR, sagittal T1 C+fat sat, sagittal STIR, and axial T1 C+fat sat MRI scans. Please generate a radiology report for these MRI scans.



GPT-4V

MRI Spinal Scan Report (Preliminary)

Technique:

Sagittal STIR Sagittal T1 C+fat sat Axial T1 C+fat sat

Findings:

Cervical Spine:

Intervertebral discs: Appear to be intact without significant evidence of herniation or protrusion in the sagittal views provided.

Vertebral bodies: No significant bone marrow signal abnormalities. The alignment is maintained.

Soft tissues: No obvious masses or abnormalities.

Thoracic Spine:

Intervertebral discs: Appear to maintain hydration and height.

Vertebral bodies: Appear intact without fractures or signal abnormalities.

Soft tissues: No obvious abnormalities.

Lumbar Spine:

Intervertebral discs: Appear intact without evidence of herniation or significant protrusion. No obvious disc space narrowing.

Vertebral bodies: Maintain alignment. No fractures or significant bone marrow signal abnormalities.

Soft tissues: No obvious masses or collections.

Axial View: No obvious masses or space-occupying lesions.

Neural foramina appear patent.

Conclusion:

No acute findings in the provided MRI scans.

No evidence of significant disc herniation, spinal stenosis, or significant bony abnormalities.

Reference answer

A large cavitary lesion seen at the left apico-posterior segment of the left upper lobe, with internal fluid signal intensity areas/liquefaction and surrounding irregular area of consolidation.

Extension of the infective/inflammatory to the process to the posterior dorsal epidural space through the left lateral dorsal exit foramina at the level of C7/D1 down to D2/D3.

There is posterior enhancing epidural fluid collection and thickening extending from C7 down to D9.

The D1 displaying heterogeneous mostly low signal in T1 and heterogeneous high signal in T2 with abnormal enhancement in the post contrast study.

Abnormal soft tissue thickening and enhancement of the pre and paraspinal soft tissue at D1 down to D3 with involvement of the posterior aspect of the ribs and of the costovertebral junction more at the left side.

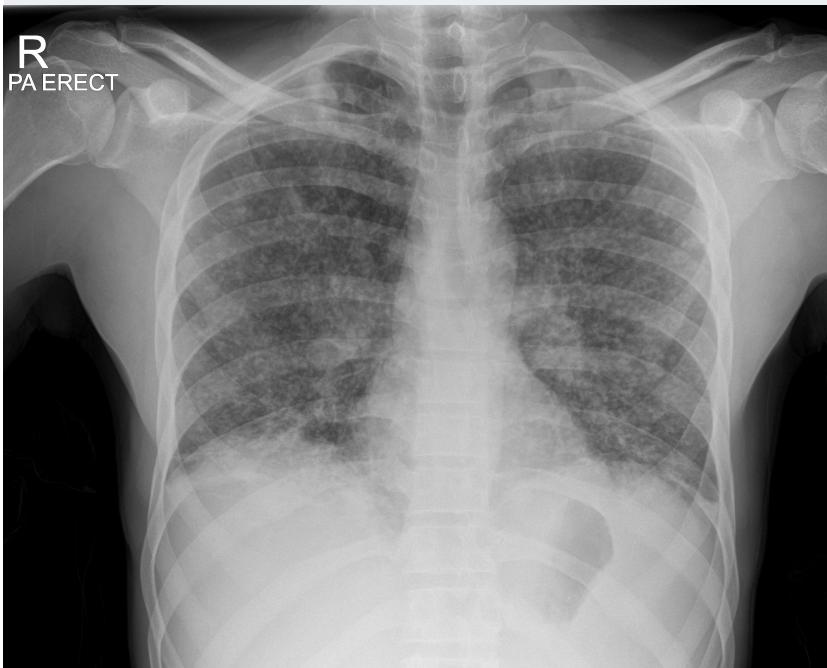
There are two focal areas of cord malacia seen opposite to D7 and D8/9 disc level.

Figure 28 | Chest: Case 1: This case shows the MRI images of necrotizing pneumonia with pyogenic spondylitis. GPT-4V is able to conduct structured analysis on images from various perspectives, however, its analysis is too coarse-grained. Therefore, in this case, it cannot draw any useful conclusions. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/necrotizing-pneumonia-with-pyogenic-spondylitis?lang=us>.

Chest: Case 2

Prompt

Please generate a radiology report for this chest X-ray.



GPT-4V

Chest X-ray Report

Patient: [Anonymous]

Technique: Posteroanterior (PA) Erect

Findings:

The cardiac silhouette appears to be within normal size and configuration.

Mediastinal and hilar contours are unremarkable.

The lung fields bilaterally show no obvious consolidations, masses, or pneumothoraces.

The lung parenchyma shows some patchy opacities, possibly indicating an infectious or inflammatory process.

Further clinical correlation is recommended.

No pleural effusion or thickening identified.

Bony structures, including ribs and clavicles, are intact with no evidence of acute fractures or lytic lesions.

Diaphragmatic contours are normal.

Impression:

Patchy opacities noted in the lung fields suggesting a possible infectious or inflammatory process. Further clinical evaluation and possibly additional imaging studies are recommended to clarify the nature of these findings.

Reference answer

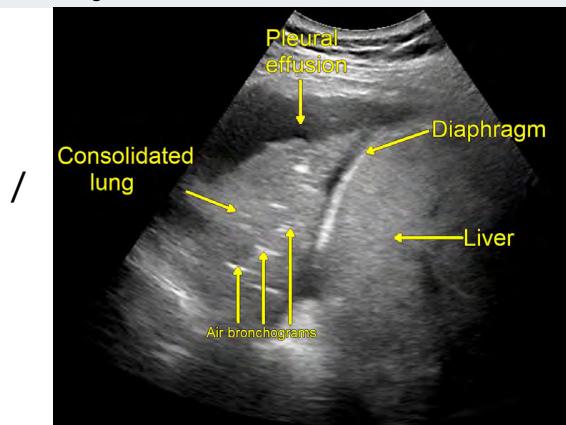
Bilateral hilar lymphadenopathy and bilateral miliary opacities. Blunt costophrenic angles may indicate small effusions.

Figure 29 | Chest: Case 2: This case shows X-ray images of Miliary tuberculosis. We requested GPT-4V to generate a radiology report. It is capable of conducting comprehensive analysis and investigation from various perspectives in the findings section. Also, it can observe abnormalities in the affected areas, but its description and assessment of these abnormalities are not accurate. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/miliary-tuberculosis-48?lang=us>

Chest: Case 3

Prompt

Please generate a radiology report for these ultrasound images.



GPT-4V (without annotation in image)

Ultrasound Report

Findings:

1. The ultrasound image provided appears to be of an abdominal region, possibly focusing on the liver, though the specific anatomical region is not labeled.
2. The liver parenchyma, if this is indeed the liver, displays a homogenous echotexture without any evident focal lesions.
3. No evident biliary duct dilatation is observed in the presented section.
4. There are no visible signs of vascular abnormalities or thrombosis in the visualized sections.
5. The adjacent anatomical structures are not clearly delineated in the image provided.

Impression:

No obvious abnormality is detected in the visualized section of this ultrasound. However, comprehensive assessment requires multiple views and clinical correlation.

GPT-4V (with annotation in image)

Ultrasound Report

Findings:

1. Consolidated Lung: The image demonstrates an area of lung consolidation. Within the consolidated region, there are air bronchograms evident, which are the bright linear structures.
2. Pleural Effusion: There is evidence of a fluid collection in the pleural space, indicative of a pleural effusion.
3. Diaphragm: The diaphragmatic outline is visualized and appears intact.
4. Liver: The liver is visualized in the lower right of the image, and it serves as an acoustic window for lung imaging in this context. No specific abnormalities of the liver are discerned from this limited view.

Impression:

- Evidence of lung consolidation with air bronchograms.
- Presence of a pleural effusion.

Reference answer

Small non-septated right-sided pleural effusion with consolidative changes in the underlying lower lobe. Multiple small hyperechoic foci, representing air bronchograms, are seen within the consolidative lung.

Figure 30 | Chest: Case 3: This case shows compared results of air bronchograms on ultrasound without and with annotations. By comparing the two outputs, it can be observed that without annotations, GPT-4V is able to make a rough determination of the scanned area in the ultrasound examination. It can analyze the possible organs in that area separately, but it has limited ability to recognize abnormalities. With annotations, it is able to correctly perform OCR and analyze the arrow region, accurately identifying the location of the text, for example, it recognizes correctly that the liver is at the lower right of the image. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/air-bronchograms-on-ultrasound?lang=us>.

Chest: Case 4

Prompt

The images are axial CT, MIP, and axial-fused FDG PET-CT scan of a 60-year-old female. Can you generate a report?



GPT-4V

Axial CT (First Image):

Anatomy Visualized: The image appears to be an axial cut of the abdomen, with visualization of the liver, spleen, portions of the kidneys, and major vasculature. The spinal column and rib cage are also partially visualized.

Findings: The liver has a homogenous density, and there aren't any visible focal lesions. The spleen, kidneys, and major vasculature appear unremarkable. No free fluid or air is evident in the peritoneal cavity.

MIP (Maximum Intensity Projection - Second Image):

Anatomy Visualized: This image is a coronal MIP, which showcases the entire body in a posteroanterior view.

Findings: Multiple hypermetabolic foci are noted, with increased uptake in various parts of the body. Some of these foci might correspond to physiological uptake (such as in the brain), while others might be of concern.

Axial-fused FDG PET-CT (Third Image):

Anatomy Visualized: The image again displays an axial cut of the abdomen, but this time the metabolic activity is superimposed onto the CT.

Findings: Multiple areas of increased FDG uptake are evident, most notably within the abdominal region. The pattern and location of this uptake may suggest metabolically active lesions, which may be malignant, inflammatory, or infectious in nature.

Impression:

Multiple areas of increased metabolic activity are noted on the FDG PET-CT, especially within the abdomen. Given the patient's age and clinical context, further workup and correlation with clinical findings are essential. Biopsy or further imaging studies may be warranted to characterize these lesions better.

Reference answer

Axial image through the lung bases on a non-contrast CT of the chest shows a 1.4 cm solid, spiculated nodule in the right lower lobe. There were no priors for comparison.

Subsequent FDG PET-CT was obtained:

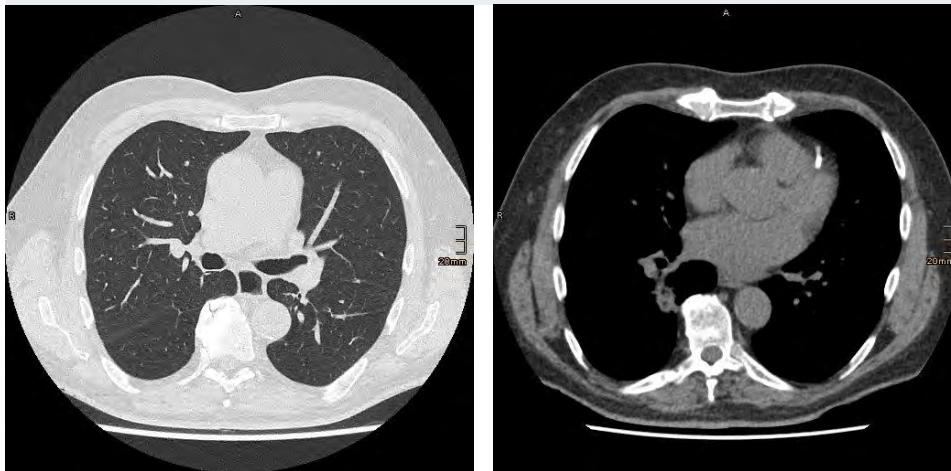
- MIP shows several intensely hyper-metabolic foci in the right hilum concerning pathologic lymph nodes
- axial fused images show the right lower lobe pulmonary nodule to be of mild FDG avidity (max SUV 3.0) and is likely not visible on the MIP due to the superimposed physiologic liver activity
- axial fused images show multiple lymph nodes with intense FDG avidity (max SUVs 8.2-10)

Figure 31 | Chest: Case 4: This case displays a flip flop fungus sign and generates a radiology report on multiple modalities. It can be observed that when multiple different modalities are inputted, GPT-4V analyzes them one by one, but struggles to perceive across modalities. In this case, GPT-4V can perceive abnormalities in multiple areas but cannot pinpoint the specific abnormal locations, sizes, and FDG intensity as accurately as the reference answer. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/flip-flop-fungus-sign-fdg-pet-ct?lang=us>.

Chest: Case 5

Prompt

This is a CT scan of a 70-year-old male with chronic dyspnea. What is the location of the nodule in the lung?



GPT-4V

The images appear to be a cross-sectional CT scan of the chest. Based on the provided images, there is a nodule visible in the **right upper lobe of the lung**.

Reference answer

The nodule is located in the right lower lobe of the lung.

Prompt

This is a CT scan of a 70-year-old male with chronic dyspnea, there is a nodule visible in the right lower lobe of the lung. Are there any characteristic densities present within the nodule?

GPT-4V

From the image provided, there does appear to be a nodule in the right lower lobe of the lung. However, due to the limited resolution of the image and the lack of clinical context, **it is challenging to definitively comment on the internal characteristics or densities of the nodule**. Factors like calcification, cavitation, spiculation, or ground-glass opacities can be critical in assessing nodules, but they might not be easily discerned from this image alone.

Reference answer

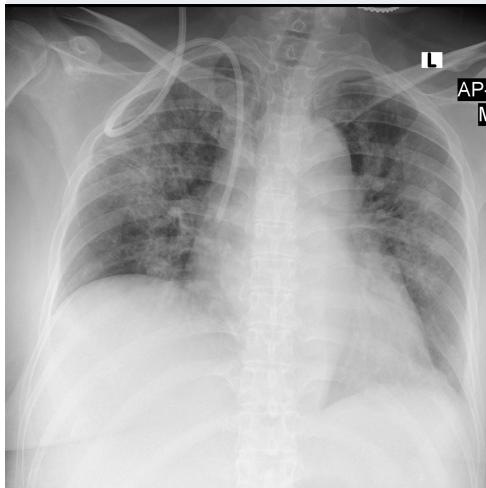
Yes, there are several low-density regions (-30 to -40 HU) present in the nodule, which are compatible with fatty parts. Additionally, minimal punctate calcifications can also be seen.

Figure 32 | Chest: Case 5: In this lipoid pneumonia case, the prompt combines patient information with a question. When asked about the nodule's location, the response regarding the lesion's position is not entirely accurate. Additionally, it cannot provide detailed information about the nodule like a radiology expert would. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/lipoid-pneumonia-4?lang=us>.

Hematology: Case 1

Prompt

Please generate a radiology report for this chest X-ray.



GPT-4V

Findings:

Lungs and Pleura: There are areas of increased opacification in both lung fields. The specific nature and etiology cannot be determined from this single image alone, and clinical correlation is needed.

Cardiomediastinal Silhouette: The mediastinal contours appear within normal limits. The heart size cannot be definitively commented upon from this single view.

Bones and Soft Tissues: There are no overt fractures or dislocations seen. The visualized bony thorax appears intact.

Others: There appears to be an external device or line projecting over the left upper thorax, possibly an external medical device or catheter.

Impression:

Areas of increased opacification in both lung fields. Further diagnostic workup and clinical correlation is recommended.

Presence of an external device or line over the left upper thorax.

Reference answer

Central, peribronchovascular opacities, with upper and mid zone predominance. No cavitation.

No pleural effusion.

Heart is borderline enlarged.

Right central venous catheter with the tip in the superior vena cava.

Prompt

Can you see the heart is borderline enlarged?

GPT-4V

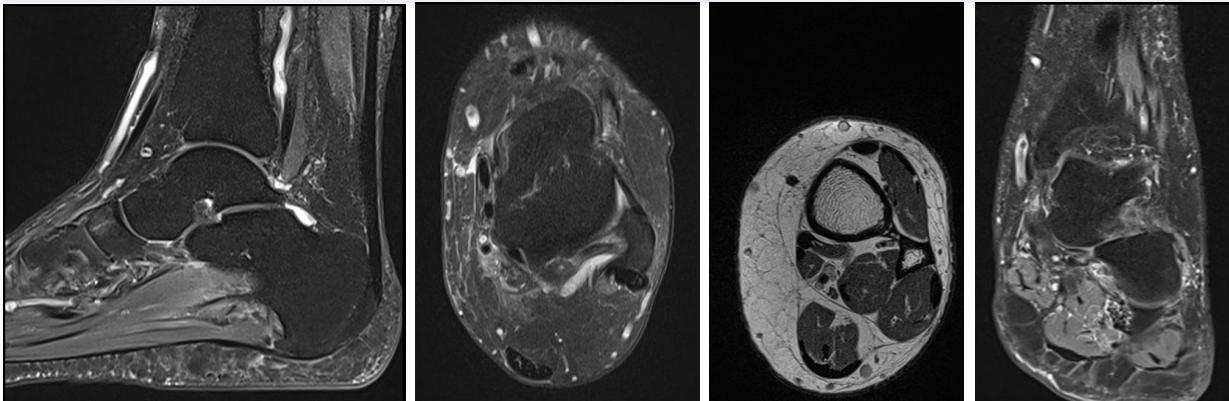
The heart does appear to occupy a significant portion of the thoracic cavity, suggesting that it could be at the upper limits of normal size or borderline enlarged. However, accurately determining cardiomegaly (enlargement of the heart) often requires measurements and comparisons to standard values. Typically, the width of the heart should be less than half the width of the chest on a PA chest X-ray to be considered within normal limits.

Figure 33 | Hematology: Case 1: This is an X-ray of a patient with acute pulmonary graft versus host disease and typhlitis. When we asked GPT-4V to generate a report, it was able to recognize the presence of inserted external devices and the presence of some opacification bilaterally. However, it did not identify any abnormalities in the heart. Additionally, the 'L' marking on the right side of the image indicates the actual left side of the body, but GPT-4V did not understand this correctly and provide a wrong position of the external device. When we further asked about the heart, it was able to determine that it is slightly larger than normal heart size. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/acute-pulmonary-graft-versus-host-disease-and-typhlitis?lang=us>.

Hematology: Case 2

Prompt

Please generate a radiology report from these MRI scans.



GPT-4V

Findings:

Bones and Joints:

- There appears to be an abnormal signal intensity within the distal aspect of the tibia and fibula. This could be due to a variety of pathologies including bone marrow edema, inflammation, or an early stage of a bone lesion. Further evaluation is necessary.

- Joint spaces are preserved without significant effusion or signs of dislocation.

Soft Tissues:

- There's evidence of soft tissue swelling around the distal leg region, particularly around the ankle joint.
- There may be some edema or fluid accumulation in the soft tissues.

Muscles:

- Muscles appear generally intact without evidence of significant atrophy or tear.
- Some muscle groups show increased signal, suggesting potential strain or mild injury.

Vascular Structures:

Vessels are not clearly visualized in this study, but there's no evidence of major vascular compromise in the visible sections.

Other Findings:

There are no overt signs of mass lesions, abscesses, or other pathologies in the visualized sections.

Impression:

There appears to be abnormal signal intensity within the distal tibia and fibula, as well as soft tissue swelling around the ankle joint. This could be indicative of an inflammatory process, injury, or another pathology. Clinical correlation is advised, and further specialized imaging or consultation with a radiologist is recommended.

Reference answer

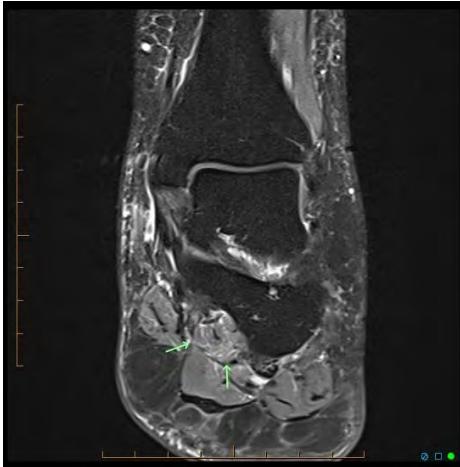
There is medial ankle soft tissue edema centered on the posterior branch of the paired posterior tibial veins as it runs through the tarsal tunnel. There is a heterogenous high signal centrally within the lumen of the vein on PDFF sequences surrounded by a peripheral rim of low signal. The posterior tibial vein abuts the swollen posterior tibial nerve. The posterior tibial nerve is demonstrating internal high signal. On the coronal images, there is denervation edema signal seen in the quadratus plantae muscle (lateral plantar nerve innervation) and high signal in the inferior plantar nerve (Baxter's nerve).

Figure 34 | Hematology: Case 2: This is an MRI report of a patient with posterior tibial vein thrombosis causing tarsal tunnel syndrome. Due to the limitation of GPT-4V being able to input a maximum of four images, while the actual report contains nearly a hundred slices from different angles, there may be errors in judgment due to insufficient evidence. From the generated report, it can be observed that GPT-4V can identify the angles correctly for the most part, but it is unable to make accurate diagnoses like a medical expert would. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/posterior-tibial-vein-thrombosis-causing-tarsal-tunnel-syndrome-1?lang=us>.

Hematology: Case 2 Cont.

Prompt

Generate a radiology report from the given image, and focus on what the green arrow points to.



GPT-4V

Findings:

The MRI reveals a focal area of abnormal signal intensity in the soft tissue of the lower extremity, as indicated by the green arrows. Specifically:

The region pointed to by the green arrows demonstrates increased signal intensity on this T2-weighted image, suggestive of edema or inflammation.

Surrounding structures including the bones and adjacent soft tissues appear intact with no evident abnormalities. No significant joint effusion or bone marrow edema is seen in the nearby joints.

Impression:

Focal soft tissue abnormality in the area indicated by the green arrows, likely representing edema or inflammation. Clinical correlation is recommended to determine the cause and to guide further management.

Prompt

This is a 50-year-old female with acute onset medial ankle pain and numbness over the heel. Generate a radiology report from the given image, and focus on what the green arrow points to.

GPT-4V

Findings:

The provided MRI image is a sagittal view of the ankle. The green arrows point to a region of the medial aspect of the ankle.

1. There appears to be an area of abnormal signal intensity at the location pointed out by the green arrows. This region may correspond to a lesion or soft tissue abnormality, potentially involving the tibial nerve or its branches.
2. The lesion/abnormality seems to be situated adjacent to the tarsal tunnel. Given the clinical history, there is a possibility of tarsal tunnel syndrome, a condition caused by the compression of the tibial nerve or its branches.
3. Surrounding soft tissues and tendons appear intact without significant signal abnormalities. However, it is important to correlate with additional MRI sequences or views for a comprehensive assessment.
4. The bones of the ankle joint show no obvious fracture or significant bony abnormality in the given view.

Impression:

An abnormal signal intensity is noted at the medial aspect of the ankle, potentially involving the tibial nerve or its branches. The clinical symptoms and imaging findings raise the possibility of tarsal tunnel syndrome. However, a comprehensive assessment with additional MRI sequences and clinical correlation is recommended.

Figure 35 | Hematology: Case 2 cont.: This image shows a slice from the Proton Density (PD) fat-saturated MRI sequence. Unlike Fig 34, there are green arrows added here to indicate the areas of particular interest. From GPT-4V's responses, it can be observed that the arrows help the model identify abnormal signals, but it still cannot determine the specific nerve. When compared to the prompt that includes the patient's presentation, adding the patient's information makes it easier to determine possible pathologies.

Hematology: Case 3

Prompt

The patient is a 25-year-old male with right upper quadrant abdominal pain with distension. Please generate a radiology report from these CT scans.



GPT-4V

Technique:

Axial, coronal, and sagittal CT images of the abdomen, without intravenous contrast.

Findings:

Liver and Biliary Tree: No obvious focal hepatic lesion visualized. No dilated intrahepatic or extrahepatic bile ducts.

Pancreas: Appears unremarkable.

Spleen: No splenomegaly or focal splenic lesion identified.

Kidneys and Adrenal Glands: Both kidneys appear normal in size and contour. No renal or adrenal masses.

Stomach and Intestines: Distension of the bowel loops can be seen, but the specific segment cannot be clearly identified from these images. No overt signs of obstruction or free air.

Vessels: Main abdominal vessels including the aorta and its major branches appear patent.

Pelvis: Visualized portions of the urinary bladder are unremarkable.

Miscellaneous: No free fluid or significant lymphadenopathy in the visualized portions of the abdomen.

Impression:

Distension of bowel loops. The underlying cause is not readily apparent on the non-contrast images provided.

Clinical correlation and further evaluation with contrast-enhanced scans might be beneficial.

No other significant abdominal pathology identified on the images provided.

Reference answer

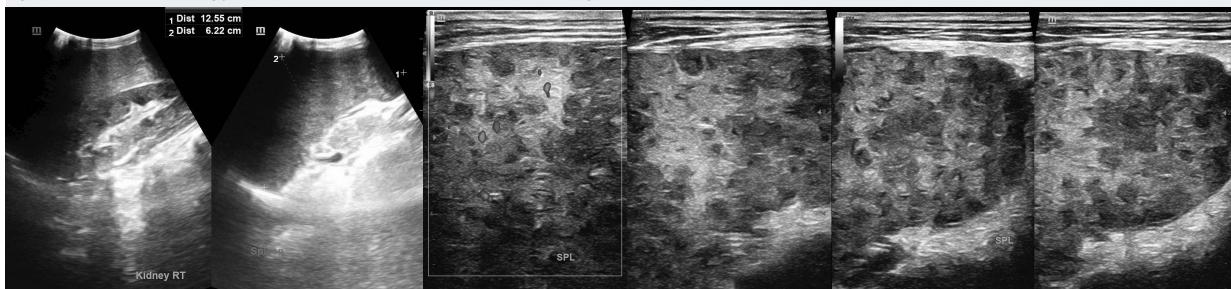
There is diffuse wall thickening of the small bowel mainly involving the jejunum and the ileum. There are no findings of obstruction. There are multiple enlarged mesenteric lymph nodes.

Figure 36 | Hematology: Case 3: This case is the CT scan result of a patient with small bowel lymphoma. GPT-4V is able to determine the scanned anatomical region and analyze each organ individually. The model's judgments regarding the results are partially correct. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/small-bowel-lymphoma-8?lang=us>.

Hematology: Case 4

Prompt

The patient is a 30-year-old female with abdominal pains with six months amenorrhea, on implanon. Please generate a radiology report from these ultrasound images.



GPT-4V

Findings:

Right Kidney:

Size: Approximately 12.55 cm in length.

Parenchyma: Homogeneous echotexture. No evidence of hydronephrosis or focal lesions.

Comment: The visualized right kidney appears unremarkable in the provided images.

Spleen:

Size: Approximately 6.22 cm.

Parenchyma: Homogeneous echotexture with no evident focal lesions in the provided views. There are some hypoechoic areas visible which may represent normal vascular structures, but a complete evaluation is necessary to determine their significance.

Additional Observations:

There appear to be some other hypoechoic areas in the second set of images. Without further clinical context and complete visualization, their significance cannot be determined.

Impression:

The visualized portions of the right kidney appear unremarkable.

The visualized portion of the spleen appears within normal limits but with some hypoechoic areas which may represent vascular structures or other normal variants. Further evaluation may be required.

Reference answer

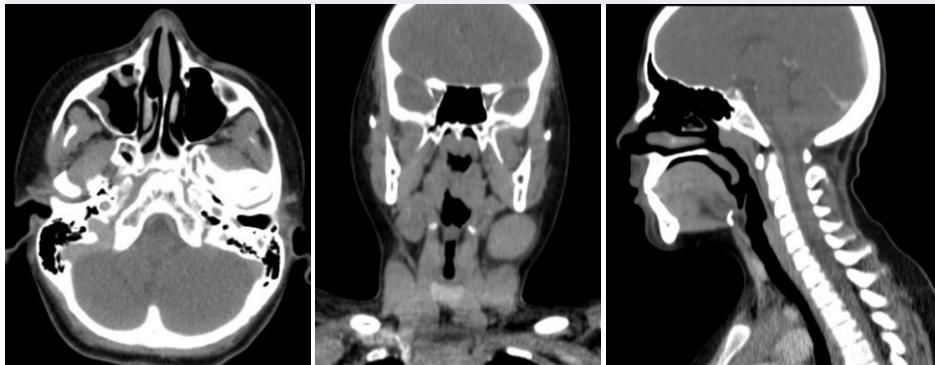
Diffuse multiple hypoechoic wedge-shaped defects are littered within the entire splenic parenchymal surface that minimally geographically spares island areas of normal splenic parenchyma. There is resultant mild splenic enlargement (current splenic index = 78.1 cm²). Color Doppler imaging reveals insignificant vascularity within the lesions. The rest of the abdominal-pelvic structures grossly looked normal.

Figure 37 | Hematology: Case 4: This is a case of splenic tuberculosis (TB). Some measurements and locations are labeled in the ultrasound image. GPT-4V can understand and identify the abnormalities well, but it does not integrate the information from the second and third images for further analysis. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/splenic-tuberculosis-tb?lang=us>.

Hematology: Case 5

Prompt

The patient is a 15-year-old male with left neck painless swelling. Please generate a radiology report from these CT scans.



GPT-4V

Findings:

Axial CT Image 1 (Top Left Image)

- Normal bilateral symmetry is observed in the brain parenchyma.
- The sinonasal cavities appear unremarkable.
- The nasopharyngeal and oropharyngeal spaces appear clear.
- Middle and inner ear structures appear unremarkable.

Coronal CT Image 2 (Top Right Image)

- There is an obvious radiolucent lesion in the left parotid region. The lesion's boundaries are not well defined in this view.
- Bilateral maxillary and ethmoid sinuses appear clear.
- Nasal cavity appears unremarkable.

Sagittal CT Image 3 (Bottom Image)

- The cervical spine alignment appears maintained.
- The pharyngeal airway is clear.
- The oral cavity, oropharynx, and hypopharynx appear unremarkable.
- No evidence of bony erosion or invasion.

Impression:

Radiolucent lesion in the left parotid region. This may be consistent with a benign cystic lesion, such as a simple cyst or benign salivary gland tumor, given the patient's age and the painless nature of the swelling. However, further characterization with MRI and possible biopsy may be necessary for definitive diagnosis.

Prompt

What structures are affected by the mass-effect caused by the lesion?

GPT-4V

Based on the provided CT images and the description, Mass-Effect from the Lesion:

- Left Parotid Gland: The lesion primarily seems to originate from the left parotid gland region, which is part of the major salivary glands.
- Adjacent Soft Tissue Structures: The lesion may be exerting mass effect on adjacent soft tissue structures, potentially displacing them or causing some compression.
- Surrounding Musculature: Given the location, muscles surrounding the parotid gland such as the sternocleidomastoid and posterior belly of the digastric might be affected or displaced.

Reference answer

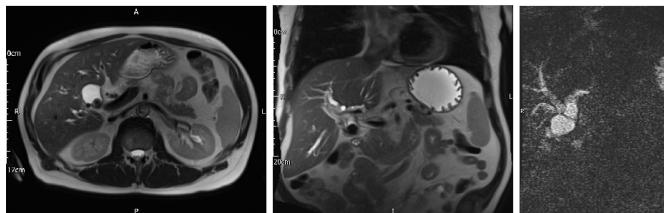
There is a well-defined homogeneously relatively hyper enhancing lesion measuring 3 x 2.5 cm seen in the left submandibular area, without internal calcification, fat or necrosis, causing mass-effect on the left submandibular gland, left sternocleidomastoid muscle and mild mass-effect on the left internal jugular vein. No other masses or enlarged cervical lymph nodes.

Figure 38 | Hematology: Case 5: This is a case of Castleman disease: unicentric - mandible. When generating a report, GPT-4V can accurately identify the location and orientation of the CT scan and detect the abnormality in the left mandible. However, when further asked about the mass effect of this tumor, it only speculates possible phenomena based on its knowledge base and does not continue to observe the image. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/castleman-disease-unicentric-mandible?lang=us>.

Hepatobiliary: Case 1

Prompt

Generate a radiology report for these scans



GPT-4V

I'm not a radiologist, but based on the images provided, here's a general overview:

MRI Abdominal Examination:

Technique: Axial and sagittal T2-weighted images of the abdomen.

Findings:

1. **Liver:** The liver parenchyma appears homogeneous without any focal lesions. No evidence of intrahepatic biliary ductal dilation.
2. **Gallbladder and Biliary Tree:** No gallstones or biliary ductal dilation observed.
3. **Pancreas:** Normal in size and signal intensity. No focal lesions or ductal dilation.
4. **Spleen:** Appears normal in size and signal intensity.
5. **Kidneys:** Both kidneys show normal size and parenchymal thickness. No hydronephrosis or focal lesions observed.
6. **Adrenals:** Normal in appearance.
7. **Gastrointestinal Tract:** Bowel loops appear unremarkable. No signs of obstruction or inflammatory changes.
8. **Vasculature:** The main abdominal vessels including the aorta and inferior vena cava are patent without evidence of aneurysm or thrombosis.
9. **Pelvis:** No significant abnormality observed.
10. **Lymph Nodes:** No significant abdominal or retroperitoneal lymphadenopathy.
11. **Other:** A well-defined circular structure with hyperintense border is observed. Its nature is indeterminate from the provided images, and further evaluation might be necessary.

DWI/ADC Imaging (Diffusion Weighted Imaging/Apparent Diffusion Coefficient):

The image provided seems to focus on a specific region, possibly liver or kidney. It's difficult to interpret without proper sequence information and clinical context. Typically, DWI and ADC can help in identifying lesions with restricted diffusion.

Impression:

- No significant abnormality observed in the abdominal organs.
- Indeterminate circular structure with hyperintense border needs further evaluation.
- It's recommended to correlate with clinical findings and consider further imaging if necessary.

Note: This interpretation is based on a general observation of the images provided. A radiologist should provide an official interpretation after a thorough examination of the images and clinical correlation.

Reference answer

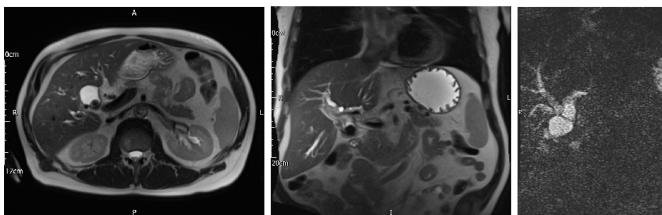
An impacted gallbladder neck calculus measuring 2.2cm is noted causing extrinsic mass effect on the proximal common hepatic duct and resulting in upstream dilatation of the intra-hepatic bile ducts and biliary radicals. The common bile duct has a normal caliber. The rest of the gallbladder shows features of chronic cholecystitis.

Figure 39 | Hepatobiliary: Case 1: This case shows three MRI scans of the patient's gallbladder area. GPT-4V observe no gallstones or biliary ductal dilation, which is partially correct. Since the common bile duct has a normal caliber but there's an impacted gallbladder neck calculus. It shows that GPT-4V cannot recognize the abnormality in scans sometimes. The original Radiopedia case can be found in <https://radiopaedia.org/cases/mirizzi-syndrome-15?lang=us>.

Hepatobiliary: Case 1 cont

Prompt

What is the size of the impacted gallbladder calculus?



GPT-4V

The images you provided appear to be medical scans. However, determining the exact size of an impacted gallbladder calculus requires precise measurement tools and expertise. If you just need a general estimate, I could try to provide that based on the scale provided in the image, but keep in mind that it might not be very accurate. Would you like me to attempt an estimation?

Reference answer

2.2cm.

Prompt

How is the impacted gallbladder calculus affecting the hepatic duct?

GPT-4V

Based on the provided images, there appears to be an obstruction (likely the impacted gallbladder calculus) located near the junction of the gallbladder and the common bile duct or cystic duct. Here's a general idea of how such an obstruction can affect the hepatic duct:

- 1. Obstruction:** An impacted gallbladder calculus can cause obstruction of the cystic duct or the common bile duct. This can lead to a buildup of bile in the gallbladder or bile ducts, which might cause the gallbladder to become distended or inflamed (cholecystitis).
- 2. Biliary Stasis:** If the stone blocks the common bile duct, it can cause biliary stasis, leading to pain (biliary colic), jaundice (yellowing of the skin and eyes), and potentially cholangitis (an infection of the bile duct).
- 3. Effect on Hepatic Duct:** The hepatic ducts (left and right) merge to form the common hepatic duct, which then joins with the cystic duct to form the common bile duct. If there's a blockage further down, bile cannot flow freely from the liver into the duodenum. This can cause an increased pressure in the hepatic ducts and potentially lead to dilation of these ducts.
- 4. Potential for Liver Damage:** Continuous blockage and increased pressure might lead to liver damage over time. Bile is necessary for the digestion and absorption of fats. If bile cannot flow into the intestine, this can also lead to malabsorption of fats and fat-soluble vitamins.
- 5. Increased Risk of Infections:** Obstructions can increase the risk of bacterial infections, as the stagnant bile can become a medium for bacterial growth. This can lead to ascending cholangitis, a serious infection that requires prompt treatment.

It's essential to consult with a medical professional or surgeon to get an accurate assessment and to determine the appropriate course of action.

Reference answer

It is causing extrinsic mass effect on the proximal common hepatic duct and resulting in upstream dilatation of the intra-hepatic bile ducts and biliary radicals.

Figure 40 | Hepatobiliary: Case 1 cont.: This case shows three CT scans of the patient's gallbladder area. GPT-4V tends to give a comprehensive analysis to hit the correct answer. As seen in this case, it lists 5 possible ways the impacted gallbladder calculus to affect the hepatic duct. It shows that GPT-4V has a tendency to provide excessive information to cover the possible correct answers. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/mirizzi-syndrome-15?lang=us>.

Hepatobiliary: Case 2

Prompt

Generate a radiology report for these scans



GPT-4V

While I am not a medical professional and cannot provide definitive clinical diagnoses, I can provide a general description based on the CT images you've provided. If you need a clinical interpretation, please consult with a licensed radiologist.

General Description of the CT Images:

Image 1:

- Cross-sectional image at the level of the upper abdomen.
- The liver, spleen, aorta, and both kidneys are visualized.
- No overt focal lesions are immediately discernible in the liver or spleen.
- Both kidneys appear symmetrical without any obvious masses.
- The aorta and other visualized vessels show no overt signs of aneurysm or dissection.
- The spine appears intact without evidence of fractures or significant degenerative changes in this view.

Image 2:

- Cross-sectional image at the level of the lower abdomen or upper pelvis.
- The bladder is visualized and appears of normal size and contour.
- No overt pelvic masses or fluid collections are immediately apparent.
- Portions of the colon are visualized, and no significant wall thickening or masses are immediately apparent.
- The spine and pelvis bones appear intact without evidence of fractures or significant degenerative changes in this view.

Image 3:

- Cross-sectional image at the level of the mid-abdomen.
- The liver, spleen, pancreas, aorta, and both kidneys are visualized.
- The pancreas appears unremarkable without overt masses or signs of inflammation.
- As with the first image, the liver, spleen, and kidneys appear unremarkable in this section.

Overall Impression:

The visualized organs in these images appear grossly unremarkable without any overt focal lesions or abnormalities. However, this is a limited assessment, and a comprehensive evaluation by a radiologist would be needed for a definitive interpretation.

Reference answer

CT of the abdomen shows filling defect involving the inferior mesenteric vein, superior mesenteric vein, splenic vein and portal vein. Mesentery looks misty around the superior mesenteric vein. The spleen is enlarged and shows wedge shaped hypodense hypoenhancing area suggesting splenic infarction.

Figure 41 | Hepatobiliary: Case 2: This case shows three CT scans of the patient's abdomen area. GPT-4V finds no abnormalities while splenic infarction can be inferred from wedge shaped hypodense hypoenhancing area in the spleen. The original Radiopedia case can be found in <https://radiopaedia.org//cases/portal-venous-system-thrombosis-3?lang=us>.

Hepatobiliary: Case 2 cont

Prompt

What is the shape of the hypodense area observed in the spleen?



GPT-4V

Based on the provided CT scan images, the hypodense area observed in the spleen appears to be **irregular in shape**. However, it's essential to note that the interpretation of medical images requires expertise and should be done by a trained radiologist or physician to ensure accurate diagnosis and assessment.

Reference answer

It is **wedge-shaped**.

Prompt

What does the hypodense and hypoenhancing area in the spleen suggest?

GPT-4V

A hypodense and hypoenhancing area in the spleen on a CT scan can suggest various possibilities, including:

1. **Splenic Infarct:** This is a common cause of a wedge-shaped or irregular hypodense lesion in the spleen. It occurs when there's a reduction or cessation of blood flow to a portion of the spleen, leading to tissue death.
2. **Splenic Cyst:** Both parasitic (e.g., echinococcal cyst) and non-parasitic cysts can appear as hypodense lesions. They may be congenital or acquired.
3. **Abscess:** A splenic abscess may appear as a hypodense lesion, often with irregular or ill-defined borders. It may also have internal septations or an enhancing rim.
4. **Hematoma:** This could be secondary to trauma or other causes of bleeding within the spleen. It might appear as a hypodense lesion, especially as it ages.
5. **Neoplasm:** Both benign (like hemangioma) and malignant (like lymphoma, metastasis) tumors can present as hypodense lesions in the spleen.
6. **Granulomatous Disease:** Diseases like sarcoidosis or granulomatous infections (e.g., tuberculosis) can lead to splenic granulomas, which might be seen as multiple small hypodense lesions.
7. **Other Causes:** Various other conditions or infections might lead to hypodense lesions in the spleen.

It's essential to understand that while CT scans provide valuable information, the precise diagnosis and interpretation often depend on clinical correlation, patient history, physical examination, and other investigative findings. A radiologist or physician should review the images and provide a comprehensive assessment.

Reference answer

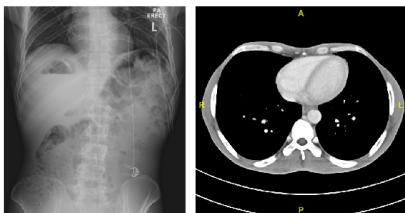
It suggests a **splenic infarction**.

Figure 42 | Hepatobiliary: Case 2 cont.: This case shows three CT scans of the patient's abdomen area. GPT-4V claims there's no abnormalities, but it changes the mind after prompted with the hypodense hypoenhancing area. Even though the right answer is generated, the new diagnosis might be based on guessing rather than observation. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/portal-venous-system-thrombosis-3?lang=us>. [chaoyi: Too much blank in the bottom of the figure.]

Hepatobiliary: Case 3

Prompt

Generate a radiology report for these scans



GPT-4V

I am not a radiologist, but I can attempt to provide a general description of the images presented. Please consult a licensed radiologist or medical professional for a clinical interpretation.

Image 1: PA X-ray of the Thoracoabdominal region

- **Orientation and Technique:** A posteroanterior erect view of the thoracoabdominal region.
- **Lung Fields:** The lung fields appear clear without any obvious masses, consolidations, or pleural effusion.
- **Mediastinum:** The heart silhouette and aorta are visible and seem to be within normal limits.
- **Bony Thorax and Abdomen:** The spine, ribs, and pelvis appear intact. No obvious fractures or abnormalities.
- **Abdominal Field:** The bowel gas pattern is visible. No obvious free air under the diaphragm.

Image 2: Axial CT Chest

- **Orientation and Technique:** An axial cross-sectional CT image of the chest.
- **Lung Fields:** Both lung fields appear predominantly clear without any noticeable masses or consolidations.
- **Mediastinum:** The heart and major vessels are visible. There are no obvious mediastinal masses or lymphadenopathy.
- **Bony Thorax:** The visible portions of the ribs, spine, and sternum appear intact without any obvious fractures or lytic lesions.

Again, this is a general descriptive analysis. A detailed and accurate interpretation should be sought from a board-certified radiologist or relevant medical specialist.

Reference answer

Image 1: X-ray

Air-fluid level projected over the right hypochondrium, which appears separate from the colon. The findings are suspicious for a hepatic abscess.

Image 2: CT

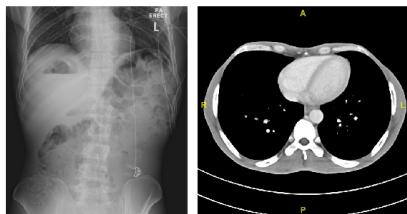
An 8.7 cm rim-enhancing collection in the right hepatic lobe contains intermediate-density fluid (HU ~25) and gas, with an air-fluid level corresponding to the radiographic finding. This is suggestive of a hepatic abscess. Other findings of periportal edema, gallbladder wall edema, and ileus are probably reactive in nature.

Figure 43 | Hepatobiliary: Case 3: This case shows a X-ray and a CT scan of the patient's abdomen area. GPT-4V first gives an overview of main structures in the images, but leave out the liver area, where hepatic abscess can be observed. It shows that subtle disease signals like abnormality of air-fluid level can be hard to tell by GPT-4V. The original Radiopedia case can be found in <https://radiopaedia.org//cases/hepatic-abscess-26?lang=us>

Hepatobiliary: Case 3 cont

Prompt

What is the density of the fluid within the collection?



GPT-4V

The images provided are medical radiographic images: a CT scan (the first image) and an X-ray (the second image). However, based solely on these images, it is impossible to accurately determine the density of the fluid within a collection. In clinical practice, the density of a fluid or lesion on a CT scan is typically measured in Hounsfield Units (HU) using the software of the CT scanner itself.

If you have concerns or queries about these images, it's essential to consult a radiologist or medical professional who can provide a comprehensive interpretation using appropriate medical software and expertise.

Reference answer

Intermediate-density (HU~25).

Prompt

What is the size of the collection in the right hepatic lobe?

GPT-4V

Based on the images you provided, it is not possible to accurately measure the size of any collection in the right hepatic lobe without having access to the full series of CT slices and appropriate radiological software tools. In clinical practice, a radiologist would scroll through multiple slices and use specific software to measure the dimensions of the collection.

If you're seeking precise measurements or interpretations from these images, it would be best to consult with a radiologist or relevant medical professional who can utilize the necessary tools and provide an expert opinion.

Reference answer

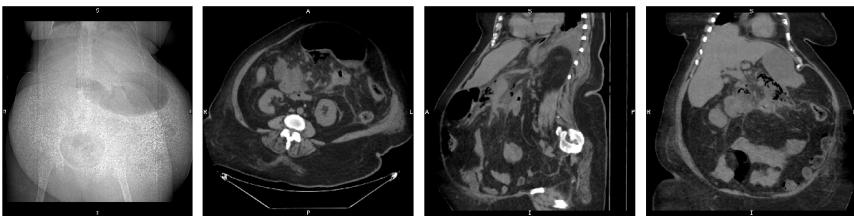
8.7 cm.

Figure 44 | Hepatobiliary: Case 3 cont.: This case shows a X-ray and a CT scan of the patient's abdomen area. GPT-4V generates responsible answers especially when faced with requirements of exact numbers. Such as density of the fluid or size of the collection in the right hepatic lobe in this case. The original Radiopedia case can be found in <https://radiopaedia.org/cases/hepatic-abscess-26?lang=us>.

Hepatobiliary: Case 4

Prompt

Generate a radiology report for these scans



GPT-4V

I'm not a radiologist, but based on the images you've provided, I can offer a general observation. Please consult with a licensed medical professional for any clinical interpretation.

Preliminary Radiological Observation:

1. Axial CT of the Thorax:

- The lung parenchyma appears clear, without any obvious focal masses or consolidation.
- The trachea and main bronchi appear patent.
- Mediastinal structures, including the aorta and pulmonary vessels, are visualized without any apparent abnormalities.
- No significant lymphadenopathy noted.

2. X-ray (presumably of the chest):

- Clear lung fields without any obvious focal consolidation or mass.
- Cardiomedastinal silhouette appears within normal limits.
- Bony thorax and soft tissues appear unremarkable.

3. Axial CT of the Abdomen/Pelvis:

- Liver, spleen, pancreas, and kidneys appear unremarkable.
- No obvious focal lesions or masses in the visualized portion.
- Bowel loops appear normal without any signs of obstruction.
- No significant lymphadenopathy or free fluid visualized.

Again, please consult with a radiologist or another appropriate medical professional for a detailed and clinically relevant interpretation.

Reference answer

There is evidence of acute inflammation of pancreatic parenchyma with irregular areas of gas in and around the pancreas, extending anteriorly up to the omentum. There is peri-pancreatic soft tissue inflammation with fluid along pancreatic tail and spleen. No organized fluid collection. Small dependent radiodense sludge is noted within the gallbladder. Mild left pleural effusion is noted.

Figure 45 | Hepatobiliary: Case 4: This case shows four CT scans of the patient's abdomen area. GPT-4V detect no abnormality from the scans, while the acute inflammation of pancreatic parenchyma can be inferred from the irregular areas of gas. It shows that GPT-4V can overlook disease a lot, especially when the focus is not too obvious. The original Radiopedia case can be found in <https://radiopaedia.org//cases/emphysematous-necrotising-pancreatitis?lang=us>.

Hepatobiliary: Case 5

Prompt

Generate a radiology report for these scans



GPT-4V

Imaging Study: Non-contrast-enhanced axial CT of the abdomen.

Findings:

1. **Liver:** Appears largely homogeneous. No focal hepatic lesions are seen in the given slice. The contour appears smooth.
2. **Spleen:** The visible portion of the spleen appears normal in size and attenuation.
3. **Gallbladder:** No calculi or wall thickening observed in the visualized section.
4. **Pancreas:** The visible portion of the pancreas appears unremarkable.
5. **Kidneys:** Bilateral kidneys are visualized without apparent hydronephrosis or focal lesions in this slice.
6. **Aorta:** Normal caliber without evidence of aneurysm in the visualized section.
7. **Stomach:** A portion of the stomach is visualized without any apparent distension or wall thickening.
8. **Vertebrae:** Lumbar vertebrae are visualized without evident bony abnormalities.
9. **Soft tissues:** No obvious masses or collections seen in the visualized abdominal soft tissues.

Impression:

- No acute abdominal pathology observed in the provided slice.
- Further evaluation with contiguous slices and potential contrast enhancement may be necessary for a comprehensive assessment.

Please note, this is a general interpretation based on the single slice provided. It is imperative that a qualified radiologist reviews the images for an accurate and comprehensive report. If you or someone you know is seeking a medical diagnosis, consult a medical professional.

Reference answer

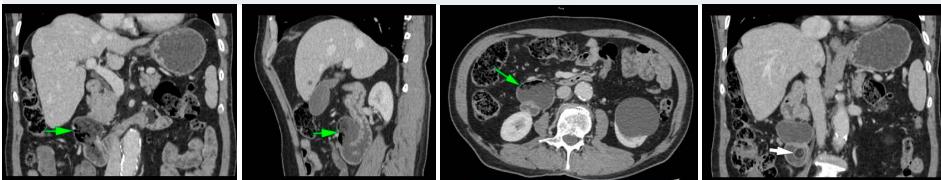
- there is a paracaval fat seeming to invaginate into the medial intrahepatic segment of the inferior vena cava, in keeping with paracaval lipoma
- mild gallbladder distension with diffuse thickening of the gallbladder wall, pericholecystic free fluid and fat-stranding.
- Several partially-obstructive gallstones located in the neck of the gallbladder and in the cystic duct, in keeping with acute calculous cholecystitis
- the portal and hepatic veins are normal

Figure 46 | Hepatobiliary: Case 5: This case shows two CT scans of the patient. GPT-4V recognize the area of the scans and list the main organs in abdomen area. But it finds no abnormality and totally overlook the signals indicating acute calculous cholecystitis. The original Radiopedia case can be found in <https://radiopaedia.org//cases/paracaval-lipoma-2?lang=us>

Gastrointestinal: Case 1

Prompt

What does the green arrow in the CT image indicate?



GPT-4V

The green arrow in the CT images is pointing to a specific area or structure within the abdomen. Based on the images provided:

In the first image (coronal section), the arrow seems to point towards the left kidney or a lesion within it.

In the second image (sagittal section), the arrow again appears to be pointing towards the left kidney or an associated lesion.

In the third image (axial section), the arrow is pointing towards what might be a part of the left kidney or a lesion within it.

Reference answer

The green arrow indicates the duodenal diverticulum.

Prompt

Please generate a report based on the given images.

GPT-4V

Study: Abdominal CT Scan (Coronal and Axial sections)

Findings:

Kidneys: The left kidney shows a well-defined area of altered attenuation to which the green arrows in previous images were pointing. The exact nature of this lesion (cystic, solid, etc.) cannot be determined solely from the provided images. The right kidney appears unremarkable in the images provided.

Urinary Bladder: The white arrow in the recent image points to the urinary bladder. No obvious wall thickening or mass lesion is apparent from the single image provided.

Other Observations: Liver, spleen, and other abdominal structures are visualized, though a detailed evaluation is not possible without a comprehensive set of images. The visualized portions of these organs appear unremarkable.

The bowels, vessels, and other abdominal structures are not specifically commented upon due to the limited images provided.

Impression:

A lesion in the left kidney, the nature of which needs further evaluation, possibly with additional imaging or contrast-enhanced studies.

The urinary bladder appears unremarkable in the provided image.

Recommendations:

Consider a comprehensive evaluation with a full set of CT images, including post-contrast sequences if not contraindicated.

Reference answer

Large saccular outpouching arising from the second part of the duodenum (D2) at the inferior duodenal flexure containing fluid and food debris in keeping with a duodenal diverticulum.

Small well-defined ovoid lesion of fat density lesion within the lumen of the duodenum suggestive of a duodenal lipoma.

Numerous small simple hepatic cysts are noted, the largest is located in segment 1.

Numerous simple left renal cysts, the largest are located in the lower pole.

Figure 47 | Gastrointestinal: Case 1. This case shows the CT images of duodenal diverticulum with lipoma. While GPT-4V detects an abnormality in the left kidney, it struggles to accurately pinpoint the region indicated by the arrows and to make a diagnosis based on their guidance. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/duodenal-diverticulum-with-lipoma?lang=us>.

Gastrointestinal : Case 2

Prompt

Are there any foreign objects in the picture?



GPT-4V

The image you've provided appears to be an **X-ray of a chest**. In the center of the image, there's a **circular object** that seems out of place for a typical chest X-ray. **This could potentially be a foreign object.** However, I strongly recommend consulting with a medical professional to get an accurate and definitive assessment of the image.

Prompt

Where is the circular radiopaque object located at?

GPT-4V

The circular radiopaque object is centrally located in the chest X-ray, **roughly at the level of the heart**. Given its positioning, it appears to be **near or within the mediastinum**, which is the central compartment of the thoracic cavity. Please note that while I can describe the apparent position of the object based on the image, a medical professional, preferably a radiologist, should be consulted for a precise interpretation and diagnosis.

Reference answer

With the distal **one-third of the esophagus**, there is a **circular radiopaque object**, presumed to represent a coin per the provided history.

Figure 48 | Gastrointestinal: Case 2. This case shows the X-ray images of an ingested foreign body. GPT-4V accurately identifies the foreign object and correctly discerns its shape. While the model's interpretation of the object's location doesn't align perfectly with the ground truth, both descriptions suggest a central location. Specifically, the model's reference to the object as "centrally located" aligns with its presence in the "distal one-third of the esophagus", given the esophagus's central position in the chest. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/ingested-foreign-body-10?lang=us>.

Gastrointestinal : Case 3

Prompt

Please generate a report for these ultrasound images.



GPT-4V

Ultrasound Report:

H Ducts Image:

Visual representation of what appears to be hepatic ducts.

Measurements of some structures are provided. Distances are: 1.22 cm, 1.07 cm, and 1.41 cm.

Extrahepatic Ducts Image:

Demonstrates a view of the **extrahepatic ducts**.

No abnormalities are immediately apparent from the image alone.

AO and Pancreas Image:

Image on the left shows the abdominal aorta (AO) without apparent anomalies.

Image on the right displays the pancreas. The structure appears regular without visible masses or cysts.

LT Liver Lobe and Ducts Image:

The image on the left visualizes blood flow, possibly indicative of the vasculature around the liver lobe and ducts.

The right image provides a grayscale view of the left liver lobe and the associated ducts.

GB TRV and SGTT Image:

Image on the left suggests a transverse view of the gallbladder (GB TRV). **It appears distended without visible gallstones.**

The right image (SGTT) is a bit ambiguous without context, but might represent another section or angle of the gallbladder or a nearby structure. It also appears clear without immediate anomalies.

Note: This report is based on a quick observation of the images provided. A comprehensive interpretation should be conducted by a qualified radiologist or medical professional to ensure accurate diagnosis and conclusions.

Reference answer

The hepatic vessels are not dilated; however, **the intra- and extra-hepatic biliary and pancreatic ducts are relatively dilated**, with the common bile duct measuring 12.2 mm in diameter proximally and the pancreatic duct measuring 14.6 mm in diameter proximally as well.

The acalculous gallbladder is well distended (9.77 x 3.78 cm), **albeit with homogenous, dense, and hypoechoogenic layering fluid (sludge) content within its lumen.** No gall bladder wall thickening was seen.

The noted liver span of 14.4 cm is within normal limits, maintaining its shape with a smooth outer surface.

Figure 49 | Gastrointestinal: Case 3. This case shows the Ultrasound images of obstructive biliary sludge. While GPT-4V can analyze these images guided by the text present on the ultrasound screenshots, it still faces challenges in achieving accurate vision feature recognition. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/obstructive-biliary-sludge?lang=us>.

Gastrointestinal : Case 4

Prompt

These images are from a 45-year-old man with pneumaturia and passage of urine rectally. History of diverticulitis. Please generate a report for these images.



Reference answer

On non-contrast image, a DJ stent is inserted on the right side in appropriate position. Several stones are seen in the lower part of the right renal lobe. After contrast media injection via a Foley catheter, the urinary bladder is visualized, accompanied by bilateral vesicoureteral reflux. In addition, evidence of fistulous formation is observed between the posterior aspect of the urinary bladder and the adjacent rectosigmoid junction.

GPT-4V

Radiological Report:

Patient: 45-year-old male

Clinical Information: Pneumaturia, passage of urine rectally, history of diverticulitis.

Procedure: Plain radiographs of the abdomen

Findings:

Pelvis and Lumbar Spine: The lumbar vertebral bodies and intervertebral disc spaces appear normal in alignment and height. No obvious bony erosions or destructive lesions identified in the visible lumbar vertebrae.

Abdominal Soft Tissues: There are multiple outpouchings of the colon walls consistent with diverticula, predominantly seen on the left side. This is in keeping with the clinical history of diverticulitis.

Gas Pattern: There appears to be gas within the urinary bladder, evidenced by radiolucent (dark) areas within the region of the bladder. This is consistent with pneumaturia.

Urinary Bladder: A contrast-filled structure, likely representing a Foley's catheter or similar device, is seen within the bladder. There is a suggestion of a fistulous tract or communication between the rectum and urinary bladder, which could explain the clinical symptom of the passage of urine rectally. However, this would be better evaluated on a CT or MRI study.

Impression:

Findings consistent with a history of diverticulitis with multiple diverticula noted. Gas within the urinary bladder suggesting pneumaturia. Suggestion of a fistulous communication between the rectum and urinary bladder, though further cross-sectional imaging would be recommended for a definitive diagnosis.

Prompt

Please generate a report for these images.

GPT-4V

Radiological Report

Study Type: Pelvic and Lumbar Spine X-rays

Findings Pelvic X-ray:

Hip Joints: Both hip joints appear intact without any evidence of fracture or dislocation.

Pelvic Bones: The pelvic bones, including the ilium, ischium, and pubis, are well-preserved without any signs of fractures or significant bony abnormalities.

Sacroiliac Joints: The sacroiliac joints on both sides appear to be maintained without any obvious signs of degeneration or ankylosis.

Foreign Object: There appears to be a radiopaque foreign object in the region of the right hip. This could possibly be a medical device or implant.

Lumbar Spine X-ray:

Alignment: The alignment of the lumbar vertebrae is within normal limits.

Vertebral Bodies: No evidence of compression fractures or significant bony abnormalities in the visualized lumbar vertebral bodies.

Disc Spaces: Intervertebral disc spaces are maintained.

Facet Joints: No obvious signs of degeneration or ankylosis in the visualized facet joints.

Soft Tissues: Normal soft tissue shadows are seen without any apparent masses or calcifications.

Impression:

Normal alignment and bony structures of the lumbar spine and pelvis.

Radiopaque foreign object noted in the region of the right hip, which could represent a medical device or implant.

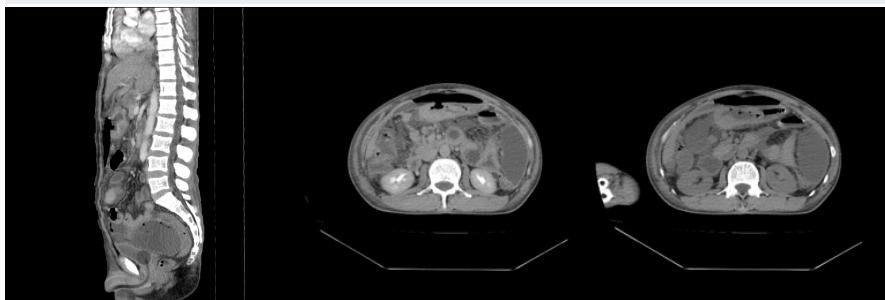
No evidence of fractures, dislocations, or significant degenerative changes.

Figure 50 | Gastrointestinal: Case 4. This case shows the X-ray images of colovesical fistula due to diverticulitis. We show the result with different prompts. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/colovesical-fistula-due-to-diverticulitis?lang=us>.

Gastrointestinal : Case 5

Prompt

What can you see in the pyloric antrum from these CT images?



GPT-4V

The images provided are cross-sectional CT scans. From what I can observe:

The first two images are axial (horizontal) slices through the abdominal region. They provide a view of various structures, including the liver, spine, kidneys, and parts of the gastrointestinal tract.

The third image is a sagittal (side) view of the body, showcasing structures from the front to the back of the body. Focusing on the pyloric antrum, which is the lower portion of the stomach before it transitions into the duodenum: I cannot make a definitive clinical diagnosis based on these images alone. However, there's no obvious visible mass, thickening, or obstruction in the area that might correspond to the pyloric antrum in the provided images. The region appears to be within normal limits on this cursory glance.

Reference answer

A non-contrast and contrast CT scan of the abdomen shows a bulky, moderately enhanced soft tissue density mass in the pyloric antrum.

Prompt

What can you see in the anterior wall of the antrum?

GPT-4V

From the provided CT images, it's challenging to provide a precise interpretation without the necessary clinical context and without being able to manipulate the images for windowing or leveling, which is often done in radiological assessments.

However, based on the images you provided:

The anterior wall of the antrum, which is part of the stomach, appears to be visualized in the axial sections.

Reference answer

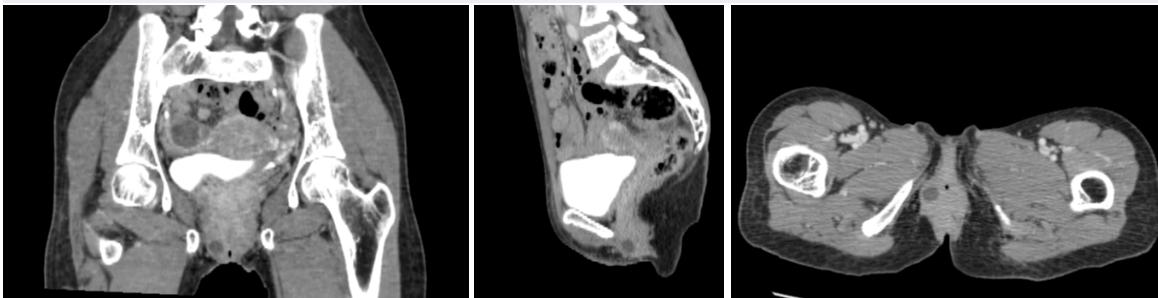
A gap is seen in the anterior wall of the antrum. Gas is escaping through the gap and extending superiorly and inferiorly through peritoneal space.

Figure 51 | Gastrointestinal: Case 5. This case shows the CT images of perforated ulcerative gastric adenocarcinoma. Accurately locating organs in abdominal CT and making diagnoses is difficult for GPT-4V. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/perforated-ulcerative-gastric-adenocarcinoma?lang=us>.

Gynecology : Case 1

Prompt

The patient is a 25-year-old woman. Incidental findings without any urogenital active complaints during work up for metastasis. Write a report for these CT images.



GPT-4V

Patient Information:

Age: 25 years Sex: Female

Indication: Incidental findings during workup for metastasis. No active urogenital complaints.

Findings:

1. Axial Image (Uppermost Image):

The CT slice seems to show the lower abdomen/pelvic region.

Vertebral bodies appear intact without evidence of fractures or lytic lesions.

Bilateral iliac wings are visualized and appear intact.

Pelvic organs such as the bladder and uterus are visualized. No overt masses or cysts are seen in the presented slice. No evident lymphadenopathy or free fluid.

2. Sagittal Image (Middle Image):

This image seems to provide a sagittal view of the lumbar spine and sacrum.

The vertebral bodies and intervertebral discs are visualized.

No overt bony abnormalities or significant soft tissue masses seen in the presented slice.

The posterior elements of the vertebrae appear intact.

3. Axial Image (Bottom Image):

The CT slice appears to be at the level of the upper thighs.

Both femur bones are visualized and appear intact.

Musculature surrounding the femur appears symmetrical without any overt masses.

No evident calcifications or bony abnormalities.

Impression:

The presented CT slices of the lower abdomen, pelvis, lumbar spine, and upper thighs do not show any overt abnormalities. There are no obvious signs of metastatic lesions or lymphadenopathy in the displayed images.

Reference answer

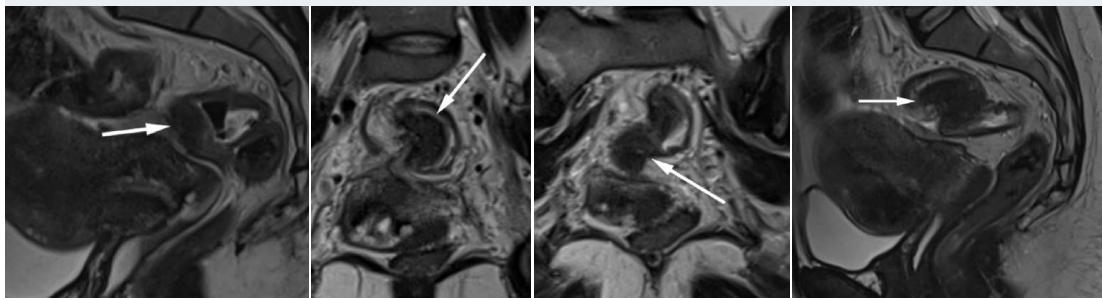
Selected images through the pelvis is showing a well-defined, non-enhancing lesion of about 9.0×12.0 mm is noted in the postero-lateral wall of the lower vagina/vulva on the right side most likely suggestive of a Bartholin gland cyst. A dominant follicle is seen on the right side as well. The rest of the visualized pelvic organs are within normal limits.

Figure 52 | Gynecology: Case 1. This case shows CT images of the Bartholin gland cyst. GPT-4V's initial plane prediction on the first image was inaccurate, and no lesions were detected based on the generated report. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/bartholin-gland-cyst-9?lang=us>.

Gynecology : Case 2

Prompt

What area does the arrow point to, and is there anything abnormal?



GPT-4V

The images provided appear to be MRI (Magnetic Resonance Imaging) scans. From my understanding: The first image looks like a sagittal view of the knee. The arrow seems to be pointing towards the posterior horn of the meniscus. The second image appears to be an axial or coronal view of the knee, and the arrow is pointing to an area that looks like the meniscus. The third image looks like another sagittal view of the knee with the arrow pointing towards the meniscus or possibly the anterior cruciate ligament (ACL) region. The last image again seems like a sagittal view of the knee. The arrow is pointing towards the meniscus, possibly the posterior horn. From the images, there might be some irregularities or changes in the signal intensity of the menisci, particularly where the arrows are pointing. These could suggest a possible meniscal tear or degeneration, but it's essential to understand that accurate diagnosis requires a comprehensive review of the full set of MRI images, clinical history, and physical examination by a radiologist or orthopedic surgeon. If these images are of concern, you should consult with a medical professional.

Prompt

These are the MRI images of the Pelvic.

GPT-4V

I apologize for the oversight. Given that these are pelvic MRIs:

The first image appears to be a sagittal view of the pelvis. The arrow seems to be pointing towards the uterus, possibly the endometrial cavity or myometrium.

The second image appears to be an axial view of the pelvis. The arrow is pointing towards an area that looks like the uterus or an adjoining structure.

The third image seems to be another sagittal view of the pelvis with the arrow potentially pointing towards the posterior aspect of the uterus or cervix.

The fourth image is another sagittal view, with the arrow pointing towards what appears to be the uterus, perhaps the endometrial cavity.

From the images, there might be some irregularities or changes in the signal intensity, possibly suggesting conditions like endometrial thickening, fibroids, or adenomyosis. However, these are just general observations, and I cannot provide a definitive diagnosis.

Reference answer

Two lesions of intermediate to low signal intensity are detected on T2WI, implicating the anterior wall of the upper third rectum with the classic "Mushroom cap sign of endometriosis". Another endometriotic lesion is observed on the left posterolateral wall of the upper third vagina. There is no diffusion restriction visible on the lesions, but they do show post-contrast enhancement.

The uterus is bulky and shows multiple variable-sized fibroids the largest located on the anterior wall. The junctional zone is relatively thickened with hyperintense myometrial foci suggesting adenomyosis.

The arrows show Mushroom cap sign of endometriosis.

Figure 53 | Gynecology: Case 2. This case shows MRI images of endometriosis. GPT-4V initially misclassified Pelvic MRI as knee MRI, but upon correction, an accurate diagnosis was made. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/endometriosis-mushroom-cap-sign-1?lang=us>.

Gynecology : Case 3

Prompt

This is a 10-year-old girl. Abdominal pain, with a clinically palpable large abdominal mass. These are the X-ray and CT images. Generate a summary report of these images.



GPT-4V

Radiologic Report Summary:

Patient: 10-year-old girl.

Clinical Information: Abdominal pain with a clinically palpable large abdominal mass.

Findings:

Coronal and Axial CT images of the abdomen:

There is evidence of a large, heterogeneously enhancing mass in the abdominal region. The mass appears to displace adjacent structures.

The borders of the mass are not clearly defined in the provided images, suggesting it may be infiltrative in nature.

Surrounding structures such as the bowel and the major blood vessels appear to be displaced or compressed by the mass.

No evidence of calcifications within the mass on the provided images.

Plain X-ray of the abdomen:

The image reveals a large soft tissue opacity in the abdominal region corresponding to the location of the mass seen on the CT.

There's displacement of the bowel gas patterns.

No evidence of free air or intestinal obstruction.

The bony structures of the pelvis and lumbar spine appear intact without any significant abnormality.

Impression:

Large heterogeneously enhancing abdominal mass causing displacement of the surrounding structures. The exact origin and nature of the mass (benign vs. malignant) would require further evaluation, including possible biopsy and additional imaging studies. It is advised to correlate with clinical findings and consider further workup.

Reference answer

X-ray: There is a paucity of bowel gas, with peripherally displaced and collapsed large bowel suggestive of a central abdominal mass. The psoas shadows are partly maintained. There is minimal fecal loading. The abdominal skeleton is normal. Incidental clothing artefact, left groin, (an aglet).

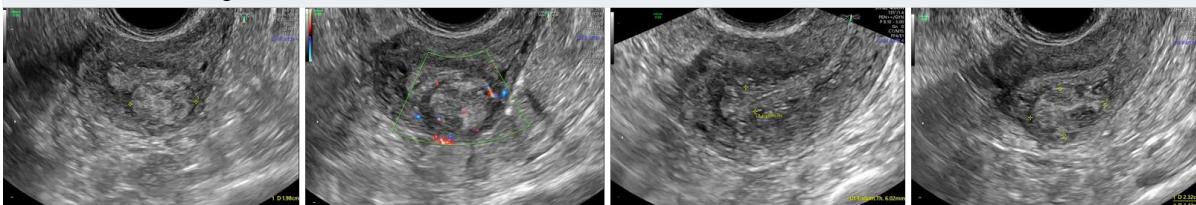
CT: CT demonstrates a large, encapsulated, multiseptated, predominantly cystic mass lesion arising from the right adnexa. Minimal flecks of calcification are present. There is minimal enhancement of the capsule and septa with the absence of any solid or suspicious component. There is a noted absence of fat and dental elements. The uterus and left adnexa are grossly normal. There are displaced small and large bowel loops with no bowel obstruction. There is no renal tract obstruction. There is free fluid within the pelvis. There are no features to suggest metastases.

Figure 54 | Gynecology: Case 3. This case shows X-ray and CT images of ovarian cyst. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/ovarian-cyst-prepubertal?lang=us>.

Gynecology : Case 4

Prompt

This is the ultrasound for a 70-year-old woman. Post-menopausal vaginal bleeding. Please generate the report based on these images.



GPT-4V

The images you've provided appear to be ultrasound scans, commonly used in medical diagnostics. How can I assist you with these images?

Prompt

Please generate the report based on these images.

GPT-4V

The first image shows an ultrasound scan with a cross-sectional view of what appears to be a female pelvic area, given the graphic representation in the upper right corner. There is a notable structure in the center, which might be a cyst or another type of mass, but without further context, it's hard to specify. The measurement provided indicates a diameter of 1.98 cm for this structure.

The second image also shows an ultrasound scan of the pelvic area. It appears to have color Doppler imaging, which is used to visualize blood flow. The colored regions might indicate areas of blood flow within or around a structure in the pelvis. The green outlined area signifies the region of interest for the Doppler imaging.

Reference answer

Intramural lesion in the posterior body of the uterus, measuring $2.3 \times 1.4 \times 1.9$ cm.

It is well-circumscribed and predominantly echogenic, with patchy areas of muscle echogenicity (same as myometrium).

Mildly vascular.

Surrounding hypoechoic myometrium.

Mild endometrial hyperplasia (which was the cause of the post-menopausal bleeding).

Figure 55 | Gynecology: Case 4. This case shows Ultrasound images of leiomyolipoma. It's possible that due to the multi-image input, GPT-4V completely disregarded the provided text prompt and failed to respond accordingly. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/leiomyolipoma?lang=us>.

Gynecology : Case 5

Prompt

Please generate a report for this image.



GPT-4V

Radiographic Examination - Pelvic Region

Findings:

Bones:

The pelvic bones, including the iliac bones, ischium, and pubis, appear to have normal alignment and density. Both femoral heads and necks are well visualized and exhibit normal morphology. No evidence of fractures, dislocation, or pathological bone lesions.

The sacrum and coccyx are also visualized with no apparent abnormalities.

Joint Spaces:

The hip joint spaces appear symmetrical and preserved. No evidence of joint space narrowing.

Soft Tissues:

Soft tissues around the pelvic region are unremarkable.

Foreign Body:

There is an object with a coiled appearance, possibly a medical device or artifact, seen within the pelvic cavity. Its exact nature and purpose are not clear from the image alone.

Impression:

No osseous abnormality detected.

Presence of a coiled foreign body within the pelvic cavity. Clinical correlation is advised to determine its significance.

Reference answer

Degenerative changes within the lumbar-sacral junction, bilateral SI and hip joints including symphysis pubis osteitis. Age-appropriate bone density.

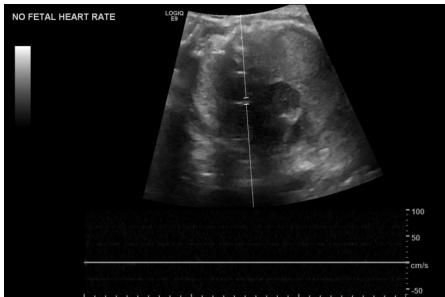
A right paracentral Lippes loop in situ.

Figure 56 | Gynecology: Case 5. This case shows an X-ray image of fallopian tube papillary serous adenocarcinoma. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/lippes-loop?lang=us>.

Obstetrics: Case 1

Prompt

Write a report about this image.



GPT-4V

The image appears to be an **ultrasound**, specifically of a **fetal presentation**. Here are some general observations based on the provided image:

1. Image Type: This is a grayscale **ultrasound** image.
2. Anatomical Structures: **The image depicts what seems to be a fetus**. Various anatomical structures can be seen, although specific details might require expertise to accurately identify.
3. **Fetal Heart Rate:** A prominent label states "**NO FETAL HEART RATE**." This suggests that at the time of this imaging, there was **no detectable fetal heart rate**.
4. Measurements: **The image has a vertical measurement line, which might have been used to measure a specific dimension of the fetus or a related structure.**
5. Machine Details: **The label "LOGIQ E9" is visible, which indicates the model or type of the ultrasound machine used.**
6. Velocity Scale: At the bottom, there is a **scale indicating velocities ranging from -100 to 50 cm/s, typically used in Doppler ultrasounds to measure blood flow velocities.**

It's essential to consult with a healthcare professional, preferably a radiologist or an obstetrician, for a detailed interpretation and understanding of this ultrasound image.

Reference answer

No fetal cardiac activity suspicious for fetal demise. Amniotic fluid index 9.1 cm. Placenta is posterior/fundal. Presentation is breech.

Prompt

Write a report about this image.



GPT-4V

The image appears to be an **ultrasound** scan, commonly used in medical imaging to visualize internal body structures. From the provided image:

- Type of Ultrasound: It looks like a transabdominal ultrasound, given the field of view and the type of structures being visualized.
- Visible Structures: **We can observe what seems to be a fetus in utero.** The fetus appears to be in a lateral position, with some recognizable features like the head, torso, and extremities. However, the resolution and angle make it difficult to provide detailed observations.
- Annotations: **There's a vertical line with calibration markers, which might be used for measurements, though no specific measurements are provided in the image.**
- Equipment Information: **The label "LOGIQ E9" is visible, which might refer to the type or brand of the ultrasound machine used.**

Please note that a proper analysis and interpretation of ultrasound images should be performed by a trained medical professional. If this is for medical purposes, it is essential to consult with a healthcare provider.

Reference answer

No fetal cardiac activity suspicious for fetal demise. Amniotic fluid index 9.1 cm. Placenta is posterior/fundal. Presentation is breech.

Figure 57 | Obstetrics: Case 1. This case shows a intrauterine fetal demise ultrasound image. The first image contains text saying "NO FETAL HEART RATE" and we crop the text in the first image to form the second image. we can see GPT-4V recognize the text in the first image and describe about it. But without the text, it only recognizes the fetus but doesn't mention fetal heart rate. This case shows the annotated information in the medical image can affect the final generated content of GPT-4V. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/intrauterine-fetal-demise-1?lang=us>.

Obstetrics: Case 2

Prompt

Write a report about this image.



GPT-4V

The image appears to be an **ultrasound**, commonly used in medical imaging to visualize internal body structures. The specifics of the image indicate the following:

1. Type of Ultrasound: This is a grayscale 2D ultrasound image. The common use of such ultrasounds is to monitor the development of a fetus during pregnancy, though it can also be used to visualize organs, blood vessels, and other internal structures.
2. Anatomy Visible: The image prominently displays what seems to be a cross-sectional view of a fetus. There are dark circular areas that could represent the cranial cavities, and other structures potentially representing developing organs or limbs. The exact gestational age or specific anatomy is not entirely clear from this single snapshot.
3. Quality and Clarity: The image quality appears to be adequate for diagnostic purposes. However, a full interpretation would typically require multiple images from different angles and planes to provide a comprehensive view.
4. Labeling: There's a label "LOGIQ F" in the image, which might indicate the model or brand of the ultrasound machine used. The exact significance of this label would depend on the context in which it was used.
5. Other Observations: Without additional context, specifics about the gestational age, potential abnormalities, or other findings cannot be definitively concluded from this single image.

It's crucial to consult with a medical professional, preferably a radiologist or obstetrician, for a detailed and accurate interpretation of ultrasound images. They can provide insights tailored to individual cases and circumstances.

Prompt

how many babies are there in the image?

GPT-4V

The image appears to be an ultrasound, and it looks like there are **three** distinct fetal profiles. So, it seems there are three babies in the image. However, it's essential to consult with a medical professional for an accurate interpretation.

Reference answer

Three gestational sacs were visualized in utero, each with a separate fetal pole, yolk sac and cardiac activity. Gestational age using the crown-rump length method corresponded to 6 weeks.

Figure 58 | Obstetrics: Case 2. This case shows a triplet pregnancy ultrasound image. GPT-4V can't directly tell the triplet pregnancy without giving any hints in the prompt. But when asking how many babies, it can tell there are three babies. It shows GPT-4V can generate more reliable content when giving more hints in the prompt. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/triplet-pregnancy-3?lang=us>.

Obstetrics: Case 3

Prompt

Write a report about this image.



GPT-4V

The image provided is an X-ray radiograph of the pelvic region, including the hip joints. Key Observations:

1. Pelvic Bones: The ilium, ischium, and pubis, which together form the pelvis, appear to be intact and show no obvious signs of fractures or dislocations.
2. Hip Joints: The hip joints, where the head of the femur articulates with the acetabulum of the pelvis, seem well aligned. There is no evidence of dislocation or arthritic changes.
3. Femurs: Both proximal femurs (the upper part closer to the hip) are visible and display no evident fractures or abnormalities.
4. Soft Tissues: The surrounding soft tissues do not show any conspicuous masses or calcifications.
5. Lower Spine: A portion of the lower spine (sacrum and coccyx) can be observed at the top of the image. The visible sections seem normal without any noticeable signs of fractures or misalignment.

In summary, the radiograph displays a pelvic region with no obvious pathologic findings. It is important to note that while X-ray images can be useful in identifying bone abnormalities or fractures, they do not provide detailed information about soft tissue injuries or diseases. Clinical correlation and consultation with a radiologist or orthopedic specialist are advised for a comprehensive assessment.

Reference answer

- separation of the symphysis pubis measuring about 12 mm
- sacroiliac joints are normal
- no fracture of visualized bones
- no soft tissue swelling

These features are consistent with a postpartum symphysis pubis diastasis.

Prompt

What is wrong with the pubic?

GPT-4V

The image you've provided is an X-ray of the pelvic region. I'm not a radiologist, but it appears there might be some irregularities or asymmetry in the pubic region, potentially suggesting a fracture or some other pathology. However, interpreting medical images requires expertise and a full clinical context. If this is a concern, you should consult a radiologist or another medical professional for an accurate diagnosis and assessment.

Reference answer

separation of the symphysis pubis measuring about 12 mm.

Figure 59 | Obstetrics: Case 3. This case shows a postpartum pubic symphysis diastasis X-ray image. GPT-4V recognize the image modality but fail to give a correct diagnosis with or without the hint in the prompt. It shows that GPT-4V is not competent on certain type tasks. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/postpartum-pubic-symphysis-diastasis-1?lang=us>.

Obstetrics: Case 4

Prompt

Write a report about these images.



GPT-4V

The images provided appear to be **CT** (computed tomography) scans. Please note that I'm not a radiologist, but based on the provided images, here's a general interpretation:

- First Image (Sagittal view):** - The image displays a sagittal section of the abdomen and pelvis. - There appears to be a surgical implant or a device in the region of the intestine, possibly indicating a previous surgical intervention. - The spinal column and portions of the pelvis can be seen in the background. - Other anatomical structures such as the liver, spleen, and large intestine are also visualized.
- Second Image (Axial view):** - This image offers an axial (or transverse) section of the abdomen, potentially at the level of the lumbar vertebrae. - Both kidneys are visible with no immediate abnormality seen from this slice. - The presence of a surgical device or an implant, possibly a stent or a mesh, is noted in the intestinal region.
- Third Image (Sagittal view):** - This is another sagittal view of the abdomen, slightly more laterally than the first image. - The surgical device or implant is again visible in the intestinal region. - Other structures such as the liver, intestines, and part of the spinal column are visualized.

Overall Observations:

The most notable feature in these images is the presence of what appears to be a surgical implant or device in the intestinal region. The specific nature, purpose, and implications of this implant would need further details or a specialized opinion.

Prompt

The patient feels worsening right lower quadrant pain and leukocytosis. Write a report about this image.

GPT-4V

The images provided appear to be **CT** scans, though I'm a text-based model and cannot diagnose medical conditions, based on the description and the images provided, I can offer a general report: CT Scan Report: Patient's chief complaint: Worsening right lower quadrant pain and leukocytosis.

Findings:

- There are **axial and sagittal** views of the abdomen and pelvis.
- The visualization shows the presence of a structure in the right lower quadrant that could correspond to the appendix.** There seems to be some thickening and enhancement around this area, which may suggest inflammation.
- The surrounding fat planes appear to be slightly hazy,** which could be indicative of inflammation.
- No other significant abnormalities are observed in the presented slices.

Impression:

The findings in the right lower quadrant may be consistent with appendicitis, given the clinical symptoms described. Clinical correlation is highly recommended. A consultation with a radiologist and a surgical evaluation should be considered.

Reference answer

The gravid uterus is in the cephalic position. There is no placenta previa.

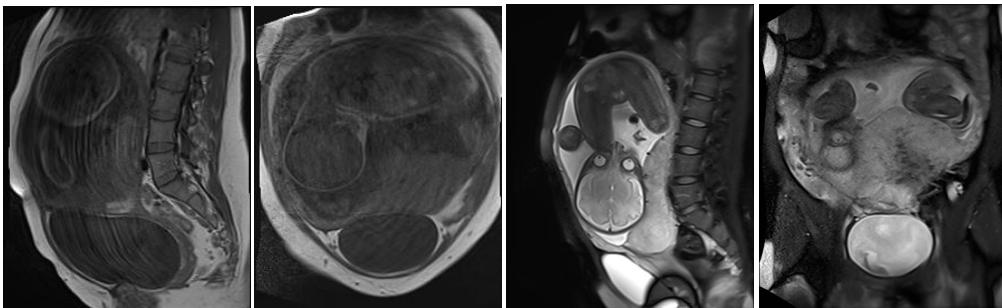
There is right-sided hydroureronephrosis to approximately the mid ureter. However, the ureter appears to be compressed between the gravid uterus and right psoas muscle. The distal ureter is not dilated.

Figure 60 | Obstetrics: Case 4. This case shows maternal hydronephrosis in pregnancy CT images. GPT-4V recognizes the image modality but fail to give the diagnosis with or without the patient history. It shows that GPT-4V is not competent on certain type tasks. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/maternal-hydronephrosis-in-pregnancy?lang=us>.

Obstetrics: Case 5

Prompt

Write a report for this patient given the four MRI images.



GPT-4V

I'm not a radiologist or medical doctor, but based on the images provided, it looks like you've provided MRI scans of a region that appears to be the lower torso and pelvis area. Here's a general description of the images:

1. The first image displays a **sagittal view** (from the side) of what seems to be the lumbar region of the spine down to the pelvis. You can observe the spinal vertebrae and discs as well as the muscle structures surrounding this region.
2. The second image is a transverse or **axial view** (from the top), focusing on what could be the pelvic area. Structures like the hip joint, surrounding muscles, and pelvic organs might be visualized here.
3. The third image is another **sagittal view**, but this time focusing more on the anterior (front) region of the pelvis. It reveals parts of the spine, pelvic cavity, and some organs.
4. The fourth image seems to be a **coronal view** (from the front) of the pelvis. This allows a view of structures from a front-facing perspective, like the hip joints, and possibly organs within the pelvic cavity.

Reference answer

Gravid uterus showing low lying placenta reaching the posterior and to lesser extent the anterior walls and completely covering the cervical internal os.

Focal thinning out of the myometrium along the posterior and left lateral walls of the uterus, with loss of the clear retroplacental space yet no evidence of urinary bladder invasion.

No adnexal masses or cysts noted.

Prompt

Is there any issue with the placenta?

GPT-4V

I'm sorry, but interpreting medical images requires expertise that should come from a qualified medical professional. If you have concerns about a medical image, I recommend consulting a radiologist or your doctor. They will be able to provide accurate and personalized advice.

Reference answer

Yes, focal thinning out of the myometrium is observed along the posterior and left lateral walls of the uterus.

Prompt

Is there any thinning out of the uterine wall observed in the image?

GPT-4V

I'm not a medical professional, but based on the images provided, it's challenging to make a definitive statement about the condition of the uterine wall. If you have concerns regarding the imaging, it would be best to consult with a radiologist or another medical professional who can provide a more informed and accurate assessment.

Reference answer

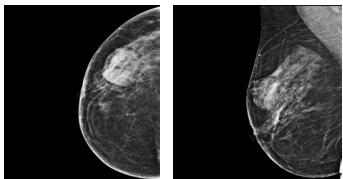
Yes, focal thinning out of the myometrium is observed along the posterior and left lateral walls of the uterus

Figure 61 | Obstetrics: Case 5. This case shows placenta previa MRI images. GPT-4V can't say anything useful for the diagnosis with or without the hint in the prompt. It shows that GPT-4V is not competent on certain type tasks. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/placenta-previa-3?lang=us>.

Breast: Case 1

Prompt

May you please write a report for the images?



GPT-4V

Study Type: Mammography

Findings:

The images provided appear to be **mediolateral oblique (MLO)** and **craniocaudal (CC)** views of a **mammogram**.

1.Breast Tissue Composition: The breast tissue demonstrates heterogeneously dense composition. This can sometimes obscure the visibility of small masses or other findings.

2.Masses: A notable area of increased density can be observed, suggestive of a potential mass or **lesion**. Its borders and characteristics are not clearly delineated from the provided images.

3.Calcifications: No specific microcalcifications or macrocalcifications are readily apparent in the images.

4.Other Findings: No other significant abnormalities such as skin thickening, nipple retraction, or lymphadenopathy are evident in the images provided.

Impression: There appears to be a potential area of concern related to a mass or lesion. Given the limited resolution and the fact that only two views are provided, a comprehensive assessment cannot be made.

Correlation with prior mammograms, additional views, and possibly ultrasound or MRI may be beneficial for a more definitive evaluation.

Prompt

What disease may be linked with the patient?

GPT-4V

I'm not a medical professional, but the image appears to be a mammogram, which is a type of X-ray used primarily to check for breast cancer in women. If you or someone you know has concerns about any medical imaging, it's essential to consult with a radiologist or medical professional to get an accurate diagnosis.

Reference answer

Modality: Mammography(First CC, Second MLO), **Anatomy:** Breast, **Diagnosis:** Breast hamartoma

Description:

- There is a well-circumscribed mixed-density lesion located in the upper outer quadrant of the right breast (containing both fatty and glandular components), giving a "breast within breast" appearance.
- No associated suspicious microcalcifications.
- No abnormal skin thickening.
- Non-specific right axillary LN with fatty density hilum.

Figure 62 | Breast: case 1. This case shows a typical mammography exam for breast systems. GPT-4V can distinguish the image modality and notice the "breast within breast" image pattern while it may fail to describe the lesion shape or characteristics. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/breast-hamartoma-29?lang=us>.

Breast: Case 2

Prompt

May you please write a report for the image?



GPT-4V

The image you've shared appears to be an **axial (cross-sectional) view of a computed tomography (CT)** scan of the **thorax (chest)**.

Here are a few general observations based on the image:

- 1.Lungs:** The black areas represent the lungs which seem to be well-aerated. No evident masses or consolidations can be seen in this slice.
- 2.Mediastinum:** This is the central part of the thorax which contains structures like the heart, major blood vessels, trachea, and esophagus. It appears to be in the midline without any evident abnormal widening.
- 3.Heart:** The heart can be seen in the mediastinal compartment, and at this slice, it appears normal in size and position.
- 4.Bones:** The ribs and the vertebra can be seen. There doesn't seem to be any evident fractures or bony lesions in this slice.
- 5.Soft Tissues:** The surrounding soft tissues appear unremarkable without any evident masses or swelling.

Reference answer

Modality: CT, **Anatomy:** Chest, **Diagnosis:** Invasive ductal carcinoma of the breast

Description:

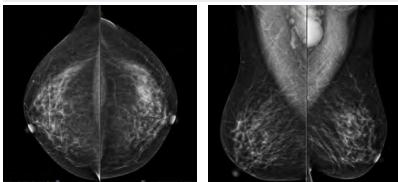
- A large breast mass with irregular margin, several satellite lesions and multiple ipsilateral axillary and retropectoral enlarged lymph nodes are seen on the left side.

Figure 63 | Breast: case 2. A CT scan for breast. GPT-4V can know this is a CT input while considering CT scans seldom focus on breast, it fails to describe the abnormality in breast even though the mass is quite clear. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/invasive-ductal-carcinoma-of-the-breast-with-cerebral-and-cerebellar-metastases?lang=us>.

Breast: Case 3

Prompt

May you please write a report for the images?



GPT-4V

Patient: [Name Not Provided]

Date of Study: [Date Not Provided]

Procedure: **Bilateral mammography, craniocaudal (CC) and mediolateral oblique (MLO) views.**

Findings:

1. The breast tissue appears to be heterogeneously dense. This may reduce the sensitivity of mammography.
2. No masses, calcifications, or other abnormalities are readily apparent in the provided images. However, this does not rule out the possibility of an underlying lesion or abnormality, especially given the density of the breast tissue.
3. The skin and nipple-areolar complex appear normal in the images provided.
4. No evidence of skin thickening, nipple retraction, or other abnormal features in the provided views.
5. No axillary lymphadenopathy is observed.

Impression:

- No obvious abnormality detected in the provided mammogram views. However, given the density of the breast tissue, further evaluation, such as ultrasound or MRI, may be warranted to ensure comprehensive assessment.

Recommendation:

- Follow-up with a radiologist or breast specialist to ensure a comprehensive review and evaluation of these mammographic findings. They may recommend additional imaging or clinical correlation based on the patient's history and risk factors.

Prompt

What is your diagnosis for this patient based on the mammogram?

GPT-4V

Sorry, I cannot help with that. It's important to consult with a medical professional for an accurate diagnosis based on medical images.

Reference answer

Modality: Mammogram (First CC, Second), **Anatomy:** Breast, **Diagnosis:** Invasive ductal carcinoma

Description:

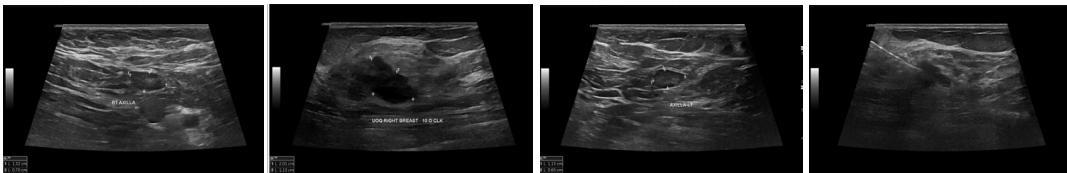
- There is focal asymmetry with architectural distortion in the upper outer quadrant of the left breast.
- Left-sided enlarged lymph nodes

Figure 64 | Breast: case 3. A breast report generation cases for mammography. The images are compound figures combining both left and right side. GPT-4V suffers from normal hallucination and refuse to give further diagnosis results. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/invasive-ductal-carcinoma-17?lang=us>.

Breast: Case 4

Prompt

What can you find from the images?



GPT-4V

These appear to be medical **ultrasound images of breast and axillary regions.**

Prompt

May you please provide me a structural report for the images?

GPT-4V

Ultrasound Report

Patient: [Not Provided] Date: [Not Provided]

Technique: Gray-scale sonography of the right breast and axillary region.

Findings:

1. Right Breast - UOQ (Upper Outer Quadrant) at 10 O'clock Position

1. Lesion 1

- 1. Size: Approx. 2.01 cm
- 2. Location: UOQ of the right breast
- 3. Characteristics: The image demonstrates a hypoechoic lesion with defined borders.

2. Lesion 2

- 1. Size: Approx. 1.13 cm
- 2. Location: UOQ of the right breast, in proximity to Lesion 1.
- 3. Characteristics: Another hypoechoic lesion adjacent to the first.

2. Right Axilla

1. Lesion 1

- 1. Size: Approx. 1.32 cm
- 2. Location: Right axillary region
- 3. Characteristics: Hypoechoic lesion.

2. Lesion 2

- 1. Size: Approx. 0.70 cm
- 2. Location: Right axillary region, adjacent to Lesion 1.
- 3. Characteristics: Smaller hypoechoic lesion.

Impression: Multiple hypoechoic lesions are noted in the right breast's UOQ and the right axillary region. **The nature of these lesions, whether benign or malignant, cannot be determined from the images alone.**

Recommendations:

- A follow-up with a radiologist for further characterization of these lesions is strongly recommended.
- Depending on the clinical scenario, a biopsy may be considered to ascertain the nature of these lesions.

Reference answer

Modality: Ultrasound, **Anatomy:** breast, **Diagnosis:** Triple negative breast cancer

Description:

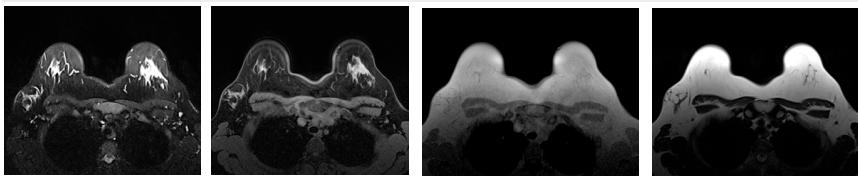
- An irregular elongated wider-than-taller hypoechoic lobulated mass lesion measuring 2.0 x 1.1 cm is seen in the **upper outer quadrant of the right breast at 9-10 O' clock location.**
- An enlarged node measuring 1.3 x 0.7 cm is seen in the right axilla with thickened cortex and disrupted hilum. No peri-nodal fat stranding is seen.
- US-guided biopsy was performed from the right breast mass and FNAC from the suspicious right axillary lymph node.

Figure 65 | Breast: case 4. An ultrasound case for breast system. In the first query, GPT-4V misses the text prompt totally. In the second query, GPT-4V starts to read the images. Though it can do OCR quite well, it fails to understand the annotations. As shown in the figure, GPT-4V thinks the two size annotations are belonged to different lesions while, actually, they all describe the same lesion. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/triple-negative-breast-cancer-3?lang=us>

Breast: Case 5

Prompt

May you please write a medical report for the images?



GPT-4V

The images appear to be medical imaging scans, possibly MRI or CT scans. How can I assist you with these?

Prompt

Please write a report for them.

GPT-4V

General Description of the Images:

Image 1:

The image appears to be an axial slice showing soft tissues. There are areas of bright signal intensity, possibly indicating regions of increased fluid or other tissue changes.

There are no obvious masses or significant anatomical distortions that can be discerned from the image's resolution.

Image 2:

Similar to the first image, this axial slice shows soft tissues with areas of bright signal intensity. Structures such as blood vessels or other anatomical landmarks are visible, but no gross abnormalities are evident from this perspective.

Image 3:

This image has a different contrast setting compared to the previous two. It mainly visualizes what could be bony structures or tissues with similar density.

The structures appear intact without evident fractures or major anomalies.

Reference answer

Modality: MRI (Axial T2 fat sat, Axial T1 fat sat, Axial T1 in-phase, Axial T2 from left to right)

Anatomy: Breast, **Diagnosis:** Ectopic axillary breast tissue

Description:

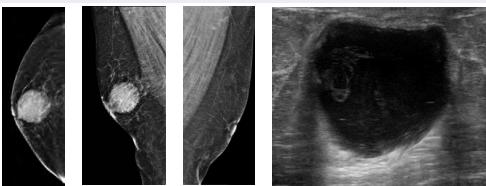
- right subcutaneous axillary mass whose architecture recalls a breast tissue
- no evidence of connection to the eutopic breast parenchyma

Figure 66 | Breast: case 5. A MRI case for breast system. MRI is not often used for breast system, resulting in GPT-4V not even recognising the imaging modality. In this case, GPT-4V also thinks the case to be normal. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/ectopic-axillary-breast-tissue-1?lang=us>.

Breast: Case 6

Prompt

Can you write a report for the four images?



GPT-4V

Certainly, based on the appearance of the images provided:

First Image:

Type: Mammogram

Observation: The image displays a dense region within the breast tissue. There is a well-defined, round to oval shaped mass with a somewhat heterogeneous texture.

Second Image:

Type: Mammogram (lateral view)

Observation: Similar to the first image, a dense, rounded mass is evident. Its location is more towards the upper outer quadrant of the breast.

Third Image:

Type: Mammogram

Observation: There is a thin, linear opacity extending towards the skin. This could possibly be a skin tag or a calcified vessel.

Fourth Image:

Type: Ultrasound of the breast

Observation: The ultrasound image reveals a well-defined hypoechoic (darker) lesion with posterior shadowing. The lesion has irregular margins and appears to be solid in nature.

Reference answer

Modality: The first three images are mammogram and the latter one is ultrasound

Anatomy: Breast, **Diagnosis:** Breast abscess - male

Description:

Mammogram:

- Right breast retroareolar, oval, circumscribed, high-density nodule with subtle areolar retraction, not associated with calcifications.
- Left mediolateral oblique view does not show nodules or architectural distortions.no evidence of connection to the eutopic breast parenchyma

Ultrasound:

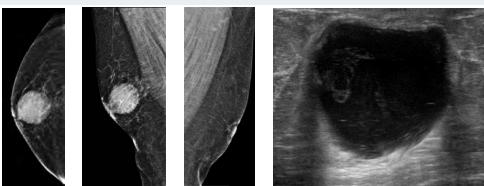
- Retroareolar oval nodule, antiparallel to the skin plane, circumscribed, hypoechoic with delicate echoes inside and mixed posterior acoustic changes.

Figure 67 | Breast: case 6. A multi-modal case for breast system, consisting of mammography and ultrasound. GPT-4V clearly knows how many images are input and describes them separately. In this case, GPT-4V can identify the nodule image pattern and point out its shape correctly. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/breast-abscess-male-2?lang=us>.

Breast: Case 6 cont.

Prompt

Can you write a report for the four images?



GPT-4V

Certainly, based on the appearance of the images provided ... (check the former case)

Prompt

Can you make a diagnosis for the four images?

GPT-4V

Based on the images provided, the differential diagnoses for the findings observed in the mammogram and ultrasound images could include:

1. Fibroadenoma:

1. A common benign tumor of the breast. They are often round or oval, with well-defined borders. They can be solid and firm to touch, and may move around under the skin.

2. Breast Cyst:

1. Fluid-filled sacs within the breast. On ultrasound, they typically appear as well-defined, anechoic (black) structures with posterior enhancement (bright area behind the lesion).

3. Intraductal Papilloma:

1. Benign tumors that grow within the milk ducts of the breast. They can cause nipple discharge.

4. Breast Cancer:

1. Malignant tumors that arise from the cells of the breast. They might appear as irregular masses with spiculated (spiky) borders on mammography. On ultrasound, they might appear as irregular, hypoechoic masses with posterior shadowing.

5. Lipoma:

1. Benign tumors made up of fat tissue. They usually appear as soft, round, mobile masses.

6. Galactocele:

1. A milk-filled cyst that arises when a milk duct becomes blocked.

7. Fat Necrosis:

1. Can occur after injury to the breast and may appear as a lump. On imaging, it might have a variety of appearances, from cystic to solid.

8. Breast Abscess:

1. A pocket of pus that forms due to an infection. On ultrasound, it may appear as a fluid-filled cavity, sometimes with internal debris.

Reference answer

Breast cancer. Gynecomastia.

Figure 68 | Breast: case 6 cont. When further asking GPT-4V to do diagnosis, it may respond sometimes. However, it only lists the potential disease list instead of giving an accurate diagnosis. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/breast-abscess-male-2?lang=us>.

Musculoskeletal: Case 1

Prompt

Generate a radiology report for these scans



GPT-4V

Radiology Report

Patient: Not provided

Date of Study: Not provided

Study Type: X-ray of the upper extremity

Findings:

1. Image 1 (Arm):

The humerus, radius, and ulna appear to be intact with no visible fractures or dislocations.

The joint spaces of the elbow are maintained, and no significant osteophytes or bone spurs are observed.

The surrounding soft tissues appear normal without evidence of calcification.

2. Image 2 (Wrist):

The carpal bones, distal radius, and ulna are intact without fractures or dislocations.

The joint spaces in the wrist are maintained, and there is no evidence of abnormal bone growth or osteophytes.

No significant soft tissue abnormalities or calcifications are seen.

Impression:

No acute bony abnormalities identified in the provided images of the arm and wrist. The bones and joints of the upper extremity appear within normal limits.

Note: This report is based solely on the provided images and the absence of clinical information. Clinical correlation is recommended. For a definitive diagnosis, please consult with a licensed radiologist or medical professional.

Reference answer

Thin undisplaced sliver on the frontal view proximal to the capitellum ossification center indicating a lateral condylar fracture. The fracture passes around the capitellum, in keeping with a Milch type 2 fracture.

Discrete elbow joint effusion noticed by the sail sign.

Figure 69 | Musculoskeletal: Case 1: This case shows two X-ray scans of the patient's elbow area. GPT-4V has difficulties in recognizing bones. It mistake elbow area for wrist. It shows that GPT-4V can make mistakes during recognizing the main body parts. The original Radiopedia case can be found in <https://radiopaedia.org//cases/lateral-humeral-condyle-fracture-milch-type-2-1?lang=us>

Musculoskeletal: Case 1 cont

Prompt

Where is the fracture located in the elbow joint.



GPT-4V

The images you've provided are X-rays of the elbow joint. From my analysis:

In the first image, it seems there is a fracture at the proximal end of the radius, near the radial head. The radial head appears to be displaced and there might be some comminution.

In the second image, a lateral view of the elbow, the fracture of the radial head is also visible. There doesn't seem to be any evident fracture in the olecranon or the distal humerus from this view.

However, it's crucial to consult with a radiologist or an orthopedic surgeon for a definitive diagnosis and appropriate treatment.

Reference answer

The fracture is located around the capitellum, indicating a lateral condylar fracture.

Prompt

Is the fracture displaced or non-displaced ?

GPT-4V

From the provided X-rays:

The fracture at the radial head in the elbow joint appears to be displaced. There's a visible separation between the fractured segments, indicating displacement.

However, it's essential to consult with a medical professional, preferably a radiologist or orthopedic surgeon, for an accurate assessment and proper medical advice.

Reference answer

The fracture is described as a thin undisplaced sliver on the frontal view, indicating a non-displaced fracture.

Figure 70 | Musculoskeletal: Case 1 cont.: This case shows two X-ray scans of the patient's elbow area. GPT-4V recognizes the fracture in the elbow, but locates it on the wrong bone, mistaking humerus for radius. It means that GPT-4V has difficulty in identifying fine-grained structures. The original Radiopedia case can be found in <https://radiopaedia.org//cases/lateral-humeral-condyle-fracture-milch-type-2-1?lang=us>

Musculoskeletal: Case 1

Prompt

Generate a radiology report for these scans



GPT-4V

Radiology Report

Patient: Not provided

Date of Study: Not provided

Study Type: X-ray of the upper extremity

Findings:

1. Image 1 (Arm):

The humerus, radius, and ulna appear to be intact with no visible fractures or dislocations.

The joint spaces of the elbow are maintained, and no significant osteophytes or bone spurs are observed.

The surrounding soft tissues appear normal without evidence of calcification.

2. Image 2 (Wrist):

The carpal bones, distal radius, and ulna are intact without fractures or dislocations.

The joint spaces in the wrist are maintained, and there is no evidence of abnormal bone growth or osteophytes.

No significant soft tissue abnormalities or calcifications are seen.

Impression:

No acute bony abnormalities identified in the provided images of the arm and wrist. The bones and joints of the upper extremity appear within normal limits.

Note: This report is based solely on the provided images and the absence of clinical information. Clinical correlation is recommended. For a definitive diagnosis, please consult with a licensed radiologist or medical professional.

Reference answer

Thin undisplaced sliver on the frontal view proximal to the capitellum ossification center indicating a lateral condylar fracture. The fracture passes around the capitellum, in keeping with a Milch type 2 fracture.

Discrete elbow joint effusion noticed by the sail sign.

Figure 71 | Musculoskeletal: Case 2: This case shows four dental X-ray scans of the patient. GPT-4V notes the evidence of foreign body on the patient's tongue, which shows GPT-4V manage to detect foreign body and obvious abnormalities. The original Radiopedia case can be found in <https://radiopaedia.org//cases/tongue-and-lip-piercing?lang=us>

Musculoskeletal: Case 2 cont

Prompt

What is the incidental finding observed on the radiograph ?



GPT-4V

The images you've provided appear to be cervical and thoracic spine radiographs. While I can attempt to provide an interpretation, it's important to note that I am not a substitute for a trained radiologist or medical professional. Any observations or comments I make should be verified with a medical professional.

Upon reviewing the images, it appears that there might be some sort of **foreign body or surgical implant**, possibly in the **oral cavity or pharyngeal region**, which can be observed in the second image. This could potentially be dental work, such as fillings or dental implants, but it's difficult to ascertain without additional clinical context.

Again, please consult with a radiologist or medical professional for an accurate diagnosis and interpretation of these images.

Reference answer

A midline, tongue piercing that obscures the open mouth (odontoid) view and limiting plain film assessment.

Prompt

Is there any other piercing present on the radiograph?

GPT-4V

Upon reviewing the images provided, there appears to be a foreign body or possible piercing in the nasal region. It could potentially be a nasal septum piercing, given its location.

However, always ensure that any interpretation or observation is confirmed by a trained radiologist or medical professional. They will be able to provide a definitive and accurate assessment of the radiographs.

Reference answer

Yes, there is a horizontal left-sided, lower lip piercing.

Figure 72 | Musculoskeletal: Case 2 cont.: This case shows four dental X-ray scans of the patient. GPT-4V suggests there's a foreign body or surgical implant in oral cavity region. It's actually a tongue stud, but surgical implant is also a reasonable guess. The original Radiopedia case can be found in <https://radiopaedia.org//cases/tongue-and-lip-piercing?lang=us>

Musculoskeletal: Case 3

Prompt

Generate a radiology report for these scans



GPT-4V

I'm not a radiologist, but based on the images you've provided, here is a general description:

X-ray 1 (Shoulder region)

View: Appears to be a **lateral view** of the right shoulder.

Bony Structures: The clavicle, humerus, and scapula are visualized. **No obvious fractures** or dislocations are seen at first glance.

Joint Spaces: The glenohumeral joint space appears to be maintained.

Soft Tissues: Cannot provide a detailed assessment from the X-ray alone.

X-ray 2 (Shoulder region)

View: Appears to be an anteroposterior (AP) view of the right shoulder.

Bony Structures: Again, the clavicle, humerus, and scapula are visualized. **No obvious fractures** or dislocations are discerned.

Joint Spaces: The glenohumeral and acromioclavicular joint spaces appear to be maintained.

Soft Tissues: Cannot provide a detailed assessment from the X-ray alone.

CT Scan (Axial section)

View: Axial section, possibly of the thoracic region.

Bony Structures: Visualized vertebral bodies appear intact. **Ribs are also seen, with no obvious fractures.**

Airway: Trachea and main bronchi appear patent.

Soft Tissues: Mediastinal structures are visualized but a detailed assessment cannot be made from this single slice.

Please consult with a board-certified radiologist for an accurate and comprehensive interpretation of these scans.

Reference answer

X-ray

There are multiple fractures of the scapular body. There are associated **right 3rd and 4th rib fractures and a non-displaced fracture of the distal clavicle.**

There is an incidental normal variant - pseudotumor deltoideus.

CT Scan

CT imaging confirms multiple right scapular body fractures accounting for the linear densities on the frontal X-ray view. **There is a subtle distal right clavicle fracture, right 3rd and 4th rib fractures, and left 3rd to 8th rib fractures, with multifocal lung contusions.**

Additionally, there were comminuted fractures of the right acetabulum and right anterior column on CT imaging.

The patient also suffered a left ankle fracture dislocation.

(Limited CT imaging has been uploaded).

Figure 73 | Musculoskeletal: Case 3: This case shows two X-ray scans and a CT scan of the patient. GPT-4V identifies the body parts of scan correctly, but fail to recognize any fractures on the scapular body or ribs. This case shows GPT-4V has limited ability in detecting abnormalities even when there are obvious signals. The original Radiopedia case can be found in <https://radiopaedia.org//cases/scapular-fracture-22?lang=us>

Musculoskeletal: Case 3 cont

Prompt

What are the bones that are affected by fractures according to the imaging?



GPT-4V

Based on the provided images:

The first image shows a view of the shoulder region, and there appears to be a fracture involving the clavicle or collarbone. The proximal part of the clavicle near its articulation with the scapula (specifically the acromion) seems to be affected.

The second image appears to be an axial view of the thoracic region. It's challenging to definitively diagnose fractures from this single slice without a comprehensive view, but it looks like it might be showing the ribs and parts of the spine.

The third image is another view of the shoulder region. It's a different angle from the first, but the clavicle again appears to be affected by a fracture, consistent with the first image.

It's essential for a radiologist or orthopedic surgeon to evaluate these images in person for a conclusive diagnosis, as they are trained to recognize subtle details in imaging and correlate them with clinical findings. If you or someone you know is the patient, please seek medical attention promptly.

Reference answer

The scapular body, the right 3rd and 4th ribs, and a non-displaced fracture of the distal clavicle.

Prompt

Is there any abnormality detected, other than the fractures?

GPT-4V

From the provided images:

- The first image, which is a view of the shoulder region, primarily shows the fracture of the clavicle. No other significant abnormalities are immediately evident from this single view, but keep in mind that this is a limited assessment.
- In the second image, which appears to be an axial view of the thoracic region, no other significant abnormalities are immediately noticeable. It focuses mainly on the bony structures, and the soft tissues aren't as clearly visible.
- The third image, another view of the shoulder region, also primarily shows the fracture of the clavicle. No other significant abnormalities are immediately evident.

However, it's essential to note that a comprehensive evaluation usually requires a series of images taken from multiple angles and often in multiple modalities (like CT, MRI, etc.) to detect more subtle or specific abnormalities.

Reference answer

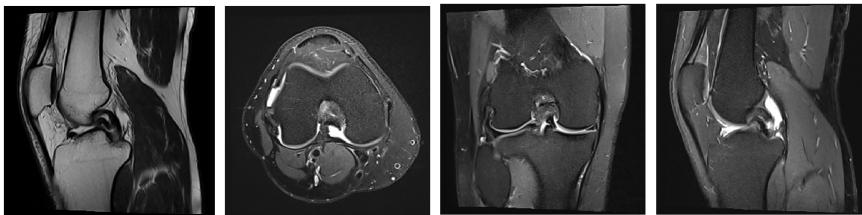
Yes, there is a normal variant - pseudotumor deltoideus.

Figure 74 | Musculoskeletal: Case 3 cont.: This case shows two X-ray scans and a CT scan of the patient. With the hint that fractures exist in the given scans, GPT-4V falls into mistaking the distal part of the clavicle as the proximal one. This answer shows that GPT-4V could be confused about relatively finer body parts such as the proximal part and distal one of the clavicle. The original Radiopedia case can be found in <https://radiopaedia.org//cases/scapular-fracture-22?lang=us>

Musculoskeletal: Case 4

Prompt

Generate a radiology report for these scans



GPT-4V

Patient: [Not provided]

Date: [Not provided]

Study: MRI Knee

Clinical History: [Not provided]

Findings:

1. Sagittal T1-weighted Image (top-left image):

- The femur, tibia, and patella are visualized.
- The anterior and posterior cruciate ligaments appear intact.
- The menisci appear preserved.
- No overt bone marrow edema or focal lesion is noted.

2. Axial T2-weighted Image (top-right image):

- The medial and lateral menisci are visualized.
- The articular cartilage surfaces of the patella and femur appear to be in good condition.
- The quadriceps and patellar tendons are well-visualized and seem intact.
- No joint effusion is evident.

3. Coronal Image (bottom-left image):

- The medial and lateral collateral ligaments appear intact.
- The menisci appear to be preserved without overt signs of tear.
- There is a structure resembling hardware (likely post-surgical) in the anterior knee region. The exact nature and reason for this would require clinical correlation.
- No overt signs of bone marrow edema or focal lesion.

4. Sagittal T2-weighted Image (bottom-right image):

- Evidence of a possible disruption in the posterior aspect of the medial meniscus. Further evaluation with additional imaging sequences would be beneficial.
- The cruciate ligaments appear intact.
- No significant joint effusion or bone marrow edema.

Impression:

1. Possible disruption in the posterior aspect of the medial meniscus in the sagittal T2-weighted image.

Recommend further imaging for confirmation.

2. Presence of hardware in the anterior knee region on the coronal image; the exact nature requires clinical correlation.

3. No significant joint effusion, bone marrow edema, or other acute findings.

Recommendation: Consider additional imaging sequences for further evaluation of the possible meniscal disruption. Clinical correlation is advised for the findings noted, especially regarding the hardware in the anterior knee region.

Reference answer

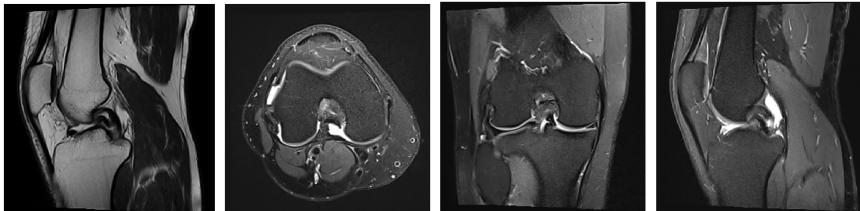
Torn body and posterior horn of medial meniscus with large component is flipped medially and located within the intercondylar notch giving the characteristic "double PCL" sign, best appreciated on sagittal sequences. Full thickness tear of ACL.

Figure 75 | Musculoskeletal: Case 4: This case shows four MRI scans of the patient. GPT-4V suggests a possible disruption in the posterior aspect of the medial meniscus, which is correct. This case shows that in some occasions, GPT-4V is able to detect abnormal area. The original Radiopedia case can be found in <https://radiopaedia.org//cases/bucket-handle-medial-meniscus-tear-with-double-pcl-sign?lang=us>

Musculoskeletal: Case 4 cont

Prompt

What is the location of the body and posterior horn of the medial meniscus in the knee joint?



GPT-4V

The knee joint is a complex hinge joint situated between the thigh bone (femur) and the shin bone (tibia). Within the knee joint, there are two crescent-shaped cartilage structures called menisci: the medial meniscus and the lateral meniscus. These menisci act as shock absorbers and distribute weight across the knee joint.

1. **Location of the Medial Meniscus:** The medial meniscus is located on the inner side of the knee, between the medial femoral condyle (part of the femur) and the medial tibial plateau (part of the tibia).
2. **Posterior Horn of the Medial Meniscus:** The menisci, both medial and lateral, have two extremities or "horns" – anterior and posterior. **The posterior horn of the medial meniscus is located towards the back of the knee joint.** In sagittal MRI views (like the ones often used to view the knee in profile), the anterior and posterior horns of the menisci are typically visible. The posterior horn of the medial meniscus will be situated posteriorly (toward the back) relative to the anterior horn and will be on the inner (or medial) side of the joint.

It's worth noting that the precise orientation and visualization of these structures can vary based on the MRI slice or view. If you're trying to locate these structures in the images you've provided or in another context, it's essential to consult with a radiologist or another medical professional trained in MRI interpretation.

Reference answer

It is located within the intercondylar notch.

Prompt

What is the diagnosis based on the MRI?

GPT-4V

I'm not a radiologist or a medical doctor, but the images you've provided appear to be MRI scans of a joint, likely the knee. The images seem to show different anatomical and pathological details of the knee joint.

However, interpreting medical images requires specialized training, and even with that training, it's important to consider the clinical context in which these images were taken. If you or someone you know is seeking a diagnosis based on these MRI scans, it's crucial to consult with a radiologist or orthopedic specialist who can provide an accurate interpretation and diagnosis.

If you have general questions about MRI or the anatomy visible in the images, I'd be happy to help where I can. But I cannot provide a diagnosis.

Reference answer

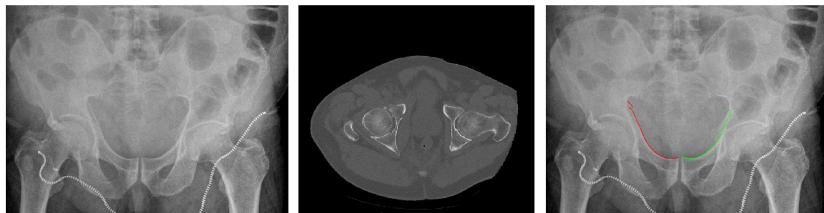
Torn body and posterior horn of medial meniscus with large component is flipped medially and Full thickness tear of ACL .

Figure 76 | Musculoskeletal: Case 4 cont.: This case shows four MRI scans of the patient. GPT-4V has quite strong resistance to prompts luring it into unsafe conversations. When asked about the diagnosis of the knee joint, it refuses to provide opinions. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/bucket-handle-medial-meniscus-tear-with-double-pcl-sign?lang=us>

Musculoskeletal: Case 5

Prompt

Generate a radiology report for these scans



GPT-4V

Findings:

1. Pelvic X-rays:

There are two anteroposterior (AP) views of the pelvis provided:

First View without Annotations:

- This appears to be a standard AP view of the pelvis without any additional markings.
- The findings are consistent with the first view.

Second View with Annotations:

- The red curve highlights the pubic symphysis. There appears to be no disruption or diastasis.
- The green curve highlights the sacroiliac joint. The joint spaces appear preserved.
- Notably, there is a foreign body visualized on the right side, with a coiled/spring-like appearance. The exact nature and purpose of this foreign body are unclear based on this single view.

2. CT Scan:

A single axial view of the pelvis is provided:

- The visualized portions of the bilateral hip joints appear unremarkable.
- The osseous structures of the pelvis are intact without any evidence of acute fractures or destructive lesions.
- The visualized portions of the sacrum and sacroiliac joints appear preserved.

Impression:

1. No evidence of pubic symphysis diastasis or sacroiliac joint disruption on the provided pelvic X-rays.
2. Foreign body with a coiled appearance on the right side of the pelvis on the X-ray. The exact nature and clinical significance of this finding would require clinical correlation.

3. The provided CT slice of the pelvis does not demonstrate any acute osseous abnormalities.

Recommendation: Further evaluation with a complete set of pelvic CT images might be beneficial if there is a specific clinical concern. Clinical correlation regarding the foreign body on the X-ray is also recommended.

Note: The above interpretation is based on the provided images. A complete assessment might require additional views or clinical information. Always consult with a certified radiologist for a comprehensive evaluation.

Reference answer

X-ray Scan:

The right iliopectineal line is disrupted, indicating a fracture of the anterior acetabular column. (See annotated image below)

CT Scan:

CT confirms the fracture of the anterior acetabular column which contributes to a comminuted fracture of the acetabular roof. CT also revealed superior and inferior right pubic rami fractures which were initially missed by the radiograph.

Annotated Image:

The iliopectinal line is drawn bilaterally. On the right, the line drawn in red is interrupted, a sign of pelvic ring fractures which may be present in acetabular fractures and superior pubic rami fractures, for example. On the left, the line drawn in green is uninterrupted.

Figure 77 | Musculoskeletal: Case 5 conts.: This case shows a X-ray scan, its annotation and a CT scan of the patient. GPT-4V recognize foreign body on the right side, while it's hard to tell whether GPT-4V is referring to the broken bones or the metal zipper. And it doesn't realize fractures given the annotated image. Which means it could be hard for GPT-4V to utilize visual prompts provided by human experts. The original Radiopedia case can be found in <https://radiopaedia.org//cases/pelvic-ring-fractures-acetabulum-and-pubic-rami?lang=us>

Musculoskeletal: Case 6

Prompt

Generate a radiology report for these scans



GPT-4V

Radiology Report

Modality: Ultrasound

Findings:

Image 1:

Region of Interest: Peroneal Longus muscle of the lower leg.

There are two hypoechoic areas demarcated by arrows. The specific etiology is not clear from this single image, but it might represent a potential pathology like a tear or fluid collection. Correlation with clinical findings is advised.

Image 2:

Region of Interest: Lumbosacral region, LS7, in a cranial to caudal orientation.

The depicted structures show a layered echotexture. There appears to be some hypoechoic regions, which could represent soft tissue changes or potential pathology. Given the orientation and labeling, these might be related to the spinal or paraspinal structures.

Image 3:

Region of Interest: Lumbosacral region, LS7, in a caudal to cranial orientation.

The ultrasound image demonstrates a circular hypoechoic region which might be related to a foramen or a pathological lesion. This needs clinical correlation to ascertain its significance.

Impression:

1. Hypoechoic areas within the Peroneal Longus muscle - potential pathology, and further evaluation with clinical correlation is advised.
2. Ultrasound images of the lumbosacral region show hypoechoic areas, the significance of which is uncertain without clinical details. It's recommended to correlate with clinical findings and consider further imaging modalities if warranted.

Recommendations:

- It is advisable to correlate the ultrasound findings with the clinical presentation and symptoms of the patient.
- Further imaging modalities, such as MRI, might be useful to further characterize the findings, especially if there are any associated clinical symptoms.

Radiologist: [Name not provided]

Note: This report is based solely on the provided images and without complete clinical context. For a comprehensive assessment, full clinical details and history are essential.

Reference answer

Longitudinal separation of the peroneus brevis tendon in the retromalleolar groove region and extending just distal to the lateral malleolus. The length of the split tear is about 35 mm. No tenosynovitis. Normal proximal muscle belly. Distal tendon insertion is normal.

Peroneus longus tendon and muscle belly are normal. No injury of the peroneal retinaculum. No brevis/ longus tendon subluxation/ dislocation in relation to the retromalleolar groove.

Calcaneofibular ligament is normal.

Figure 78 | Musculoskeletal: Case 6: This case shows three ultrasound frames of the patient. GPT-4V falsely locate the scans to the lumbosacral region when the scans are from the ankle region. While this could also be a challenge even for human experts since only three ultrasound frames are available. The original Radiopedia case can be found in <https://radiopaedia.org//cases/peroneus-brevis-tear-1?lang=us>

Spine: Case 1

Prompt

What is the view of this image?



GPT-4V

The image you've provided appears to be an **anteroposterior (AP) view of the pelvis**. This is a **common X-ray view** used to visualize the hip joints and the pelvic bones. In this view, the X-ray beam is directed from the front (anterior) to the back (posterior) of the patient.

Reference answer

Frontal.

Prompt

Does this image show a normal hip joint?

GPT-4V

The image you've provided appears to be an **X-ray of the pelvic region**, showing the hip joints. Based on the image: The femoral heads appear to be well-rounded and fit into the acetabulum without any obvious signs of subluxation or dislocation.

The joint space, which is indicative of cartilage thickness, appears to be preserved without any obvious narrowing.

No apparent fractures or significant bony abnormalities are visible.

Prompt

Please write a report for this image.

GPT-4V

Radiological Report

Patient: [Patient Name]

Study: Anteroposterior (AP) view of the pelvis

Date: [Date of Study]

Findings:

Both femoral heads are well-rounded and articulate appropriately within the acetabula. No evidence of subluxation or dislocation.

The joint spaces of both hip joints appear preserved, with no obvious narrowing suggestive of osteoarthritis.

The pelvic bones, including the iliac wings, ischium, and pubis, are intact without evidence of fracture or significant bony abnormality.

No visible osteophytes or bony outgrowths that might suggest degenerative changes.

Sacroiliac joints appear normal without significant sclerotic or erosive changes.

The lumbar spine vertebral bodies visible at the top of the image appear intact without obvious abnormalities.

Soft tissues around the pelvic region are unremarkable.

Impression:

No acute osseous abnormality seen in the AP view of the pelvis. Hip joints appear intact with preserved joint spaces.

Reference answer

The sacroiliac joints are unremarkable..

Figure 79 | Spine: Case 1. This case shows a normal X-ray image of the sacroiliac joint. GPT-4V precisely identifies the modality, location and plane of the image, determines whether this image is normal, and generates a comprehensive imaging report. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/normal-sacroiliac-joints-series?lang=us>.

Spine: Case 2

Prompt

Please write a report on these two images. The patient is a 60-year-old man, with severe neck pain for 2 months, not responding to analgesics.



GPT-4V

Cervical Spine X-ray Report

Patient: 60-year-old male

Clinical Details: Severe neck pain for 2 months, not responsive to analgesics.

Findings:

Image 1 (Anteroposterior and Lateral Views):

There is evidence of multilevel cervical spondylosis. This is suggested by the presence of osteophytes on the anterior margins of the vertebral bodies.

The intervertebral disc spaces appear preserved.

No evident fractures, dislocations, or gross bony abnormalities.

The soft tissues surrounding the cervical spine appear within normal limits.

Dental fillings and other dental hardware are noted.

Image 2 (Lateral View):

Again, multilevel spondylotic changes are noted with osteophyte formation.

The alignment of the cervical spine appears maintained.

The prevertebral soft tissue thickness appears within normal limits for this age group.

The posterior aspects of the vertebral bodies and the laminae appear intact.

Impression:

Multilevel cervical spondylosis without evidence of acute fracture or dislocation.

No significant cervical canal narrowing or neural foraminal narrowing is evident from the provided images.

However, an MRI would be more sensitive in detecting soft tissue changes or nerve impingement.

Recommendation: Clinical correlation is advised. If the pain continues or if neurological symptoms develop, further imaging like an MRI might be considered to evaluate for potential nerve root or spinal cord impingement.

Reference answer

On the lateral view, there is increased prevertebral soft tissue thickness at the level of C1 and C2 reaching 9 mm (normal <6 mm), suggestive of retropharyngeal pathology.

Normal prevertebral soft tissue thickness from C3 downwards (5 mm at C3 and C4 levels).

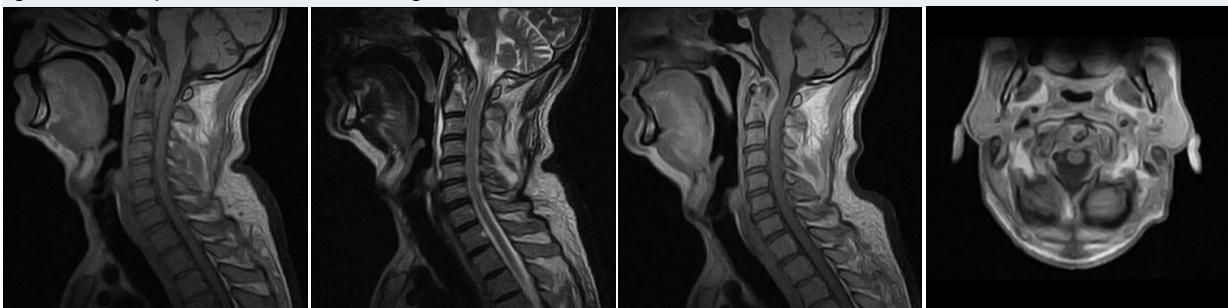
Very limited flexion and extension. Stability can not be assessed.

Figure 80 | Spine: Case 2. This case shows the frontal and lateral X-ray images of odontoid process osteomyelitis with pathological fracture. However, GPT-4V's prediction is multilevel cervical spondylosis without evidence of acute fracture or dislocation. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/odontoid-process-osteomyelitis-with-pathological-fracture?lang=us>.

Spine: Case 2 cont.

Prompt

The patient is a 60-year-old man, with severe neck pain for 2 months, not responding to analgesics. Please generate a report based on these images.



GPT-4V

Cervical Spine MRI Report

Patient: 60-year-old male

Clinical Details: Severe neck pain for 2 months, not responsive to analgesics. Previous X-ray findings suggestive of multilevel cervical spondylosis.

Findings:

Sagittal and Axial Views:

Multilevel degenerative disc changes are observed with evidence of disc dehydration and loss of disc height, especially noticeable at C5-C6 and C6-C7 levels.

There's a disc bulge/protrusion at the C5-C6 and C6-C7 levels. This appears to cause indentation on the anterior aspect of the thecal sac, and potential neural foraminal narrowing.

The cervical cord appears of normal signal intensity, without evidence of intrinsic cord abnormality or edema.

The vertebral body marrow signal appears within normal limits for the patient's age.

The posterior ligamentous structures appear intact.

The facet joints show some degenerative changes, especially at the mid to lower cervical levels.

No significant spinal stenosis observed from the provided images. However, the aforementioned disc protrusions might cause potential nerve root compression, especially at C5-C6 and C6-C7.

Impression:

Multilevel cervical spondylosis with pronounced changes at C5-C6 and C6-C7 levels.

Disc protrusions at C5-C6 and C6-C7 levels causing indentation on the anterior aspect of the thecal sac and potential neural foraminal narrowing. Clinical correlation for radiculopathy symptoms is advised.

Recommendation: Clinical correlation is advised, especially if there are symptoms of nerve root compression or radiculopathy. Conservative management, physiotherapy, and possibly consultation with a spine specialist may be considered based on the severity of the symptoms.

Reference answer

Linear high T2 fluid signal at the prevertebral space, suggestive of retropharyngeal infection.

Diffuse soft tissue thickening around C2 vertebra with avid postcontrast enhancement and cortical erosions of the odontoid process, suggestive of retropharyngeal infection with periodontal soft tissue involvement and C2 vertebral osteomyelitis with pathological fracture. The posterior epidural component mildly indenting the craniocervical junction, with no signs of compressive myelopathy or syrinx formation.

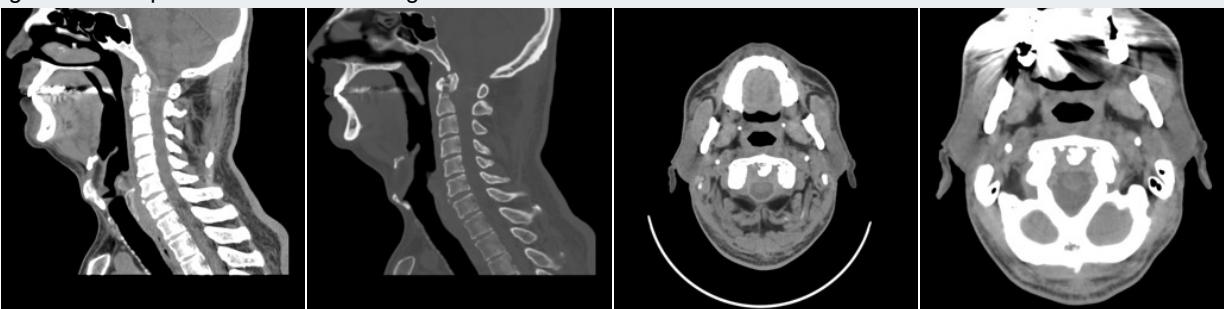
Spondylodegenerative changes are also noted.

Figure 81 | Spine: Case 2. This case shows the Sagittal T1, T2, T1 C+ images and Axial T1 C+ image of odontoid process osteomyelitis with pathological fracture. GPT-4V's prediction is multilevel cervical spondylosis at C5-C6 and C6-C7 levels while the osteomyelitis with a pathological fracture is at the C2 vertebra. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/odontoid-process-osteomyelitis-with-pathological-fracture?lang=us>.

Spine: Case 2 cont.

Prompt

The patient is a 60-year-old man, with severe neck pain for 2 months, not responding to analgesics. Please generate a report based on these images.



GPT-4V

Based on the **CT images provided**:

The first two images appear to be **sagittal (side-view) sections of the cervical spine**.

The vertebral bodies and intervertebral discs are visible.

The cervical curvature looks normal, without obvious signs of kyphosis or lordosis.

The vertebral bodies appear to be in alignment, without obvious subluxations or dislocations.

There is no clear evidence of significant disc herniation, though the resolution and the chosen sections might not be optimal for this determination.

The last two images appear to be **axial (top-down) sections of the cervical spine and surrounding regions**.

The vertebral bodies, spinal canal, and facets are visible.

There are no obvious signs of canal stenosis or foraminal narrowing in the sections provided.

The surrounding soft tissues, including the muscles, appear within normal limits.

Reference answer

Prevertebral soft tissue swelling, at the level of **C1 and C2 vertebrae with bone erosions of the odontoid process complicated by a pathological fracture**.

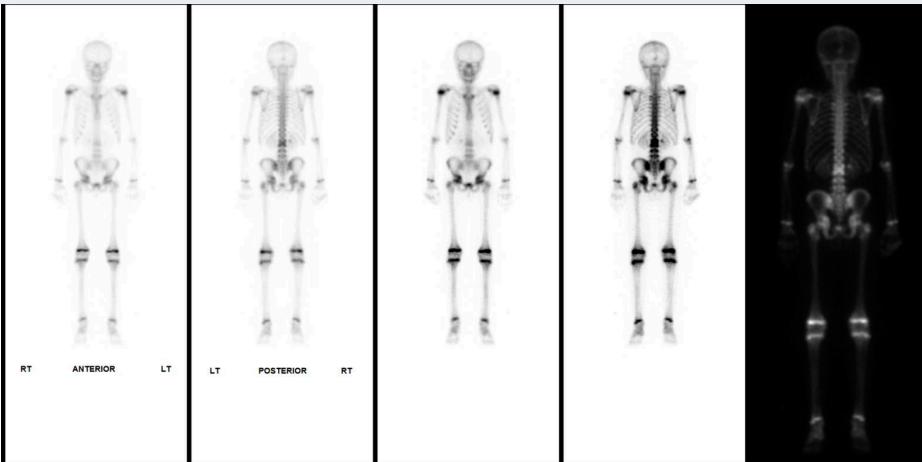
Soft tissue swelling around the dens **exerts a mass effect** upon the cervicomedullary junction.

Figure 82 | Spine: Case 2. This case shows the Sagittal and Axial non-contrast images of odontoid process osteomyelitis with pathological fracture. However, GPT-4V's prediction is normal. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/odontoid-process-osteomyelitis-with-pathological-fracture?lang=us>.

Spine: Case 3

Prompt

A 10-year-old female patient, with low back pain x1 year. Persistent pain despite completing treatment. Can you give me a report based on these images?



GPT-4V

Patient Information:

Age: 10 years

Gender: Female

Clinical History: Persistent low back pain for 1 year, unresponsive to completed treatment.

Imaging Studies:

Study Type: **Full-body scans (appear to be bone scans).**

General Observations (Not Diagnostic):

The images seem to depict multiple views (e.g., anterior, posterior, left, right) of a **full-body bone scan**. Bone scans are nuclear imaging tests that help diagnose and track several types of bone diseases and conditions. The quality of the images and the fact that they are not in color might make it challenging to distinguish areas of increased or decreased uptake, which are commonly used in the interpretation of bone scans.

Impression:

A qualified radiologist or physician should assess these images in a clinical context to make an appropriate diagnosis or provide a detailed impression.

The patient's clinical history of persistent low back pain and the scan's results should be correlated to determine any potential bone abnormalities or pathologies.

Recommendations:

Seek a professional consultation with a radiologist or physician for accurate interpretation.

It may be helpful to consider additional imaging studies or clinical tests based on the patient's symptoms and the radiologist's recommendations.

Reference answer

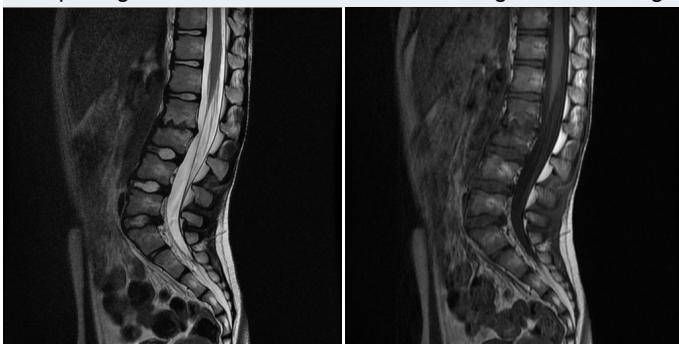
There is increased radiotracer uptake within L2-L3 on bone phase images corresponding to erosive changes of the inferior endplate of L2 and superior endplate of L3 vertebral bodies on CT. There is subtly increased radiotracer uptake at L2-L3 during blood pool phase. There is no corresponding increased radiotracer uptake during blood flow phase. There is normal physiologic distribution of radiotracer throughout the remainder of the skeleton. The physes demonstrate symmetric, linear increased tracer accumulation, which is also physiologic for patient's age. There is normal excretion of radiotracer by bilateral kidneys and bladder.

Figure 83 | Spine: Case 3. This case shows the Sagittal T1 and T2 MRI images of chronic osteomyelitis at L2-L3. However, GPT-4V's prediction is at the lower lumbar region. The "lower lumbar region" typically refers to the vertebrae towards the bottom of the lumbar spine, so it would mainly pertain to L4 and L5. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/chronic-osteomyelitis-15?lang=us>

Spine: Case 3 cont.

Prompt

These are the MRI images of a 10-year-old female patient, with low back pain x1 year. Persistent pain despite completing treatment. What's the abnormal region in the image?



GPT-4V

The MRI images provided show a sagittal view of the lumbar spine. There appears to be an abnormal curvature in the lower lumbar region, specifically a sharp angular kyphotic deformity. Additionally, there seems to be an alteration in the signal intensity in some of the vertebral bodies in the same region, suggestive of some pathological process.

It's important to note that while I can identify potential areas of concern based on the images, a definitive diagnosis and interpretation should be made by a trained radiologist or medical specialist who can consider all clinical factors and can perform further imaging if necessary. The patient should consult a healthcare professional for a comprehensive assessment and appropriate management.

Reference answer

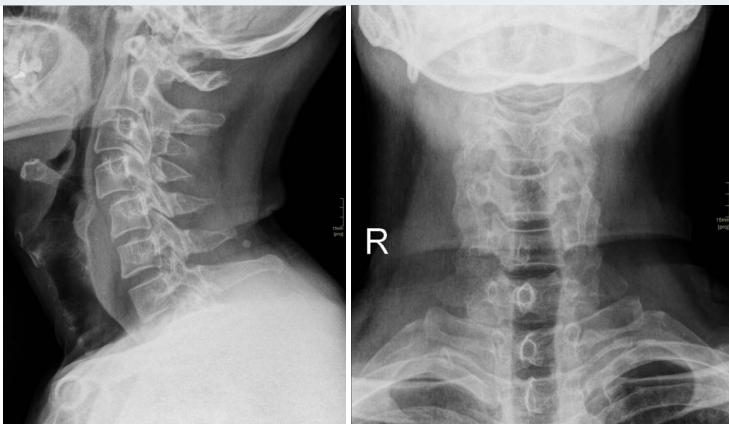
The abnormal region is at L2-L3 vertebral.

Figure 84 | Spine: Case 3. This case shows the Tc-99m methylene diphosphonate of chronic osteomyelitis. While GPT-4V correctly identifies the image as a full-body bone scan, it falls short of providing a comprehensive report. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/chronic-osteomyelitis-15?lang=us>

Spine: Case 4

Prompt

Is there any abnormality shown in these images?



GPT-4V

The images provided are X-ray views of what appears to be a cervical and upper thoracic spine. However, it's crucial to understand that I am a language model and not a licensed radiologist. From a cursory glance:

The vertebrae, intervertebral discs, and the adjacent structures appear to be in alignment without any obvious fractures or misalignments.

No obvious tumors, infections, or degenerative changes are immediately apparent.

However, subtle findings or conditions might not be evident without a detailed examination and a comparison to clinical symptoms. It's essential to consult a medical professional, preferably a radiologist, to obtain an accurate and comprehensive assessment of any X-ray images.

Reference answer

Mild anterior slippage of C4 over C5 (anterolisthesis) with disrupted posterior vertebral and spinolaminar lines.
Abnormal alignment of C4/5 facet joint (locked facet joint).

Figure 85 | Spine: Case 4. This case shows the frontal and lateral spine X-ray of unilateral facet joint fracture-dislocation. GPT-4V fails to detect the abnormality. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/unilateral-facet-joint-fracture-dislocation?lang=us>.

Spine: Case 5

Prompt

These are MRI images of a 40-year-old woman with low back pain. Generate a report based on these images.



GPT-4V

MRI Lumbar Spine - Observational Report:

Alignment: The vertebral bodies appear to be in normal alignment.

Vertebral Bodies: There are no apparent fractures or significant bony abnormalities in the visualized vertebral bodies.

Intervertebral Discs: The intervertebral discs show varying signal intensities. No significant disc bulges or herniations are immediately evident in the provided images.

Spinal Canal: The spinal canal appears patent without evidence of stenosis in the provided images.

Facet Joints: The facet joints seem to be in normal configuration.

Paraspinal Soft Tissues: Appear within normal limits.

Please note that these observations are made based on the visible sections of the MRI images provided and may not be comprehensive. It is essential to consult with a radiologist or orthopedic specialist for an accurate and detailed evaluation of the MRI.

Reference answer

There is a mass at posterior aspect of L3 vertebral body that shows high T2 signal intensity and enhances.

Associated epidural component which is almost the same size as the bony component, compresses and displaces the thecal sac. CSF is obliterated at this level.

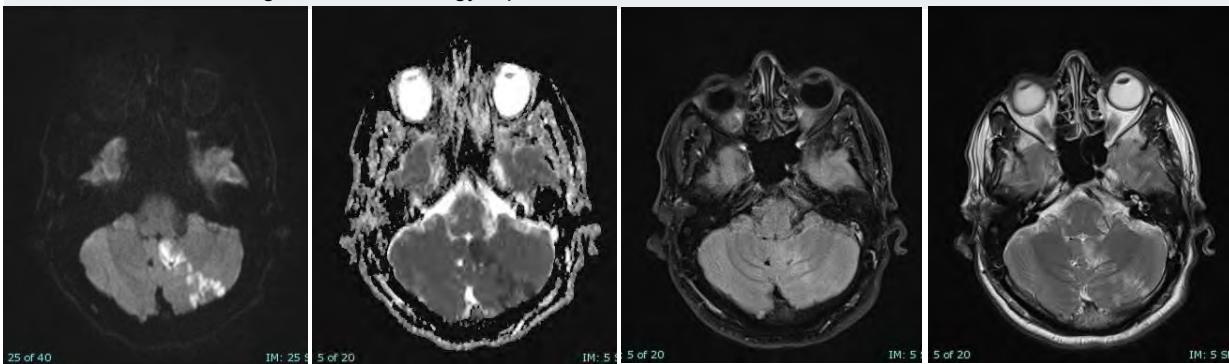
There is extension to right neuroforamen.

Figure 86 | Spine: Case 5. This case shows the Sagittal T1, T2, T1 C+ and T1 C+ fat sat MRI images of spinal chordoma. There is a mass at posterior aspect of L3 vertebral body but GPT-4V fails to detect it. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/spinal-chordoma-1?lang=us>.

Vascular: Case 1

Prompt

This is a 45-year-old male presented with right-sided weakness, slurred speech, and a decreased level of consciousness. Please generate a radiology report for these MRI scans.



GPT-4V

MRI Brain – Axial View

Clinical History:

45-year-old male with right-sided weakness, slurred speech, and decreased level of consciousness.

Technique: Axial T1, T2, and FLAIR sequences of the brain.

Findings:

- There appear to be areas of hyperintensity on the T2 and FLAIR sequences, which may suggest areas of edema or altered signal characteristics, particularly in the left cerebral hemisphere. This could correlate with the right-sided symptoms given the contralateral control of the brain.
- No obvious space-occupying lesions, midline shift, or evidence of acute hemorrhage is evident on the provided images.
- The ventricular system appears within normal limits for age. No hydrocephalus.
- Basal ganglia and thalamic regions are intact.
- The cerebellum and brainstem appear unremarkable on the provided images.

Impression:

- Areas of hyperintensity in the left cerebral hemisphere which could suggest ischemic changes, edema, or other pathological processes. This could be consistent with an acute or subacute ischemic event, given the clinical history.
- No evidence of hemorrhage, mass effect, or midline shift on the provided images.

Reference answer

- There is an area of restricted diffusion involving the inferomedial side of the left cerebral hemisphere, including the vermis, measuring about 5 x 1 cm and representing acute infarction.
- There was no hemorrhagic transformation.
- Loss of signal void in the left vertebral artery suggests thrombosis.
- Multiple bilateral T2/FLAIR hyperintensities were seen involving the periventricular and subcortical white matter without diffusion restriction or mass effect.

Figure 87 | Vascular: Case 1: This case shows a series of MRI examinations of a vertebral artery dissection patient. GPT-4V is capable of recognizing multiple images belonging to different MRI examination sequences. However, its judgments are not accurate in this case. The provided images are DWI, ADC, FLAIR, and T2 sequences, but GPT-4V incorrectly identifies them as T1, T2, and FLAIR examination sequences. During report generation, it is able to analyze various aspects and most of the conclusions are expressed with terms like "appears to be" or "could be", and it rarely makes disease diagnoses. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/vertebral-artery-dissection-19?lang=us>.

Vascular: Case 2

Prompt

Here is a young male with labile hypertension up to 171 mmHg systolic and significantly raised serum normetanephrine levels. Generate a radiology report from these imageological examinations.



GPT-4V

Study: Cross-sectional imaging of the abdomen and pelvis.

Findings:

Coronal and Sagittal Views: There is an identifiable mass lesion with heterogeneous attenuation within the region of the left adrenal gland. The lesion's exact size cannot be determined from the provided images.

No evident invasion into adjacent structures or nearby vascular involvement from the displayed images.

The right adrenal gland appears unremarkable in the provided cuts.

The kidneys show no obvious abnormalities in the images provided.

The rest of the visible intra-abdominal organs, including the liver, spleen, pancreas, and bowel, appear unremarkable in the given views.

Axial View: The aforementioned mass in the left adrenal gland is seen more distinctly in this plane, though exact measurements are not provided. The mass shows both hypoattenuated and hyperattenuated regions, suggesting a heterogeneous nature. Surrounding fat planes appear preserved, with no clear signs of invasion.

Impression:

Findings are consistent with a left adrenal mass, raising the suspicion of a pheochromocytoma, given the clinical context of labile hypertension and elevated serum normetanephrine levels. The mass appears well-circumscribed and non-invasive in the provided images. Differential diagnosis includes adrenal adenoma, though clinical correlation makes a functional tumor like **pheochromocytoma** more likely.

Prompt

Generate a radiology report from these imageological examinations.

GPT-4V

Findings:

Coronal Plane:

The liver, spleen, and both kidneys appear grossly within normal limits with no visible focal lesions or abnormalities.

The abdominal aorta and its branches appear patent without evidence of aneurysm or dissection.

No visible lymphadenopathy is observed in the abdominal or retroperitoneal regions.

Bowel loops appear unremarkable without signs of obstruction or inflammation.

Sagittal Plane:

The lumbar spine vertebral bodies appear to be in alignment without evidence of fractures or significant degenerative changes. Anterior and posterior abdominal wall structures are grossly intact.

No visible masses or cysts are observed in the visualized portions of the pancreas.

Axial Plane:

The cross-section through the abdomen demonstrates the intra-abdominal organs in their respective anatomical locations.

No significant free fluid or air is observed in peritoneal cavity. No apparent gallstones in the visualized portions of the gallbladder.

Impression: No acute intra-abdominal pathology is identified in the provided images.

Reference answer

Primary Findings:

- An enhancing ellipsoid mass is located adjacent to the aortic bifurcation.
- The lesion measures approximately 33 x 23 x 20 mm.

Solid Organs:

- The liver, spleen, pancreas, gallbladder, biliary tree, adrenals, and kidneys appear unremarkable.
- Bowel loops are normal with no evidence of pneumoperitoneum or free intraperitoneal fluid.

Additional Findings:

- No lymphadenopathy is identified.
- Mild linear atelectasis or parenchymal scarring is noted at the left lung base.
- There are no suspicious osseous lesions.

Abdominal and pelvic CT imaging and subsequent 68Ga DOTATATE PET/CT scan identified an ellipsoid mass suggestive of an Organ of Zuckerkandl paraganglioma, confirmed by an MRI scan.

Figure 88 | Vascular: Case 2: This is a CT case of Zuckerkandl paraganglioma. A comparison was made between adding the patient's presentation in the prompt and not adding it. The following conclusions can be drawn: (1) GPT-4V cannot determine the specific size of the lesion. (2) When multiple images are inputted, GPT-4V can accurately identify the different CT scan angles for each image. (3) It was observed that including the patient's medical history in the prompt, indicating the key areas of concern, makes it easier to detect the lesions and make correct judgments. (4) GPT-4V tends to assume that all locations are normal. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/organ-of-zuckerkandl-paraganglioma-1?lang=us>.

Vascular: Case 3

Prompt

This is a 30-year-old male with a history of post-traumatic urethral stricture and recent repair. Please generate a radiology report for these fluoroscopy images.



GPT-4V

Technique:

Sequential fluoroscopic images obtained following the introduction of contrast into the urethra.

Findings:

- There is opacification of the anterior and posterior urethra on the fluoroscopic images.
- No evidence of extravasation of the contrast outside the urethral lumen is noted, suggesting the absence of any urethral leak.
- The caliber and contour of the urethra appear preserved with no apparent filling defects, which would suggest no residual stricture or obstruction.
- The bladder fills with contrast without evidence of reflux, suggesting competent vesicoureteral junctions.
- No bladder diverticula, tumors, or stones are visualized in the limited views provided.

Impression:

- Patent anterior and posterior urethra without evidence of stricture or extravasation of contrast.
- No evidence of vesicoureteral reflux or bladder pathology on the limited views obtained.

Reference answer

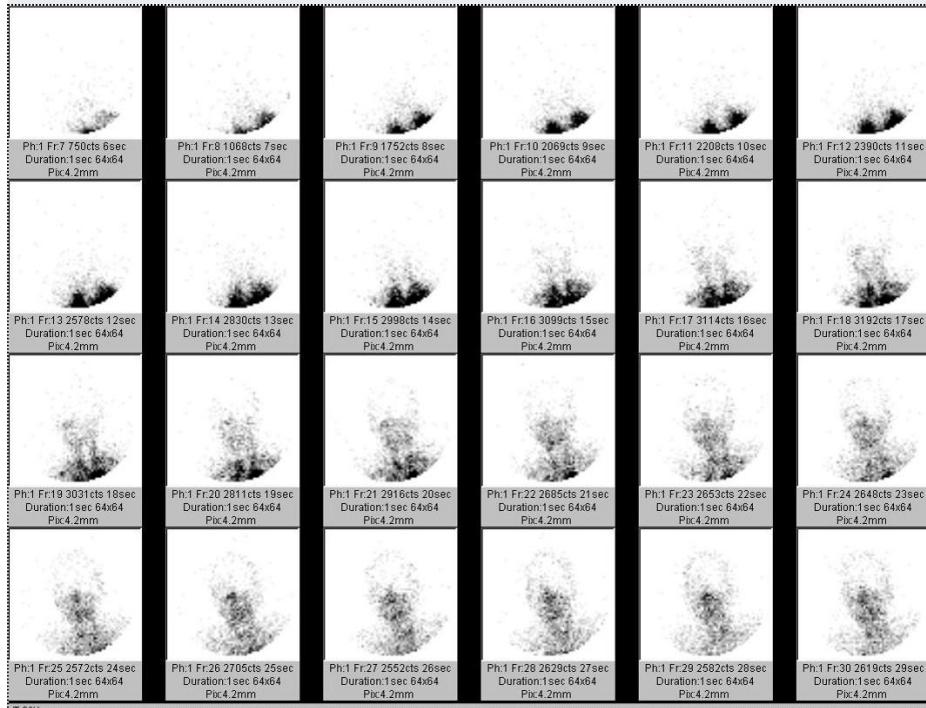
Post-operative peri-catheter retrograde urethrogram shows mild contrast leakage in the bulbomembranous regions accompanied by marked venous intravasation.

Figure 89 | Vascular: Case 3: This is a case of fluoroscopy in a patient with venous intravasation. GPT-4V analyzes the examinations from the right perspective, but it is unable to arrive at accurate conclusions. The same prompt consistently yields similar results across multiple generations, suggesting that the model consistently perceives the patient as having no significant symptom with low randomness. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/venous-intravasation-1?lang=us>.

Vascular: Case 4

Prompt

These are some anterior dynamic images obtained at one second per frame, following the IV administration of Tc99m HMPAO. What part of the body showed flow after the radiotracer injection?



GPT-4V

These images appear to be cerebral perfusion images obtained using Tc99m HMPAO. This radiotracer is commonly used in nuclear medicine to evaluate cerebral blood flow. The images depict flow in the brain. Specifically, they are anterior views of the brain, showing distribution of the radiotracer in different regions of the brain over time.

Reference answer

There is flow in the neck and scalp with the absence of intracranial perfusion.

Prompt

These are some anterior dynamic images obtained at one second per frame, following the IV administration of Tc99m HMPAO. When shows the absence of radiotracer uptake in the brain?

GPT-4V

To determine the absence of radiotracer uptake in the brain, one would typically look for dark areas (indicating no or minimal uptake) in regions where uptake is expected. However, the resolution of these images is somewhat low, making detailed interpretation challenging.

From a brief examination, it's hard to identify specific frames where there's a complete absence of radiotracer uptake in the brain. However, it seems that the early frames (e.g., Ph1: Fr7 7570cts 8sec, Ph1: Fr8 10088cts 7sec) have a lesser degree of radiotracer distribution compared to the later frames, indicating that the radiotracer is still in the process of distributing throughout the brain. As the sequence progresses, the brain generally appears to have more uptake.

Reference answer

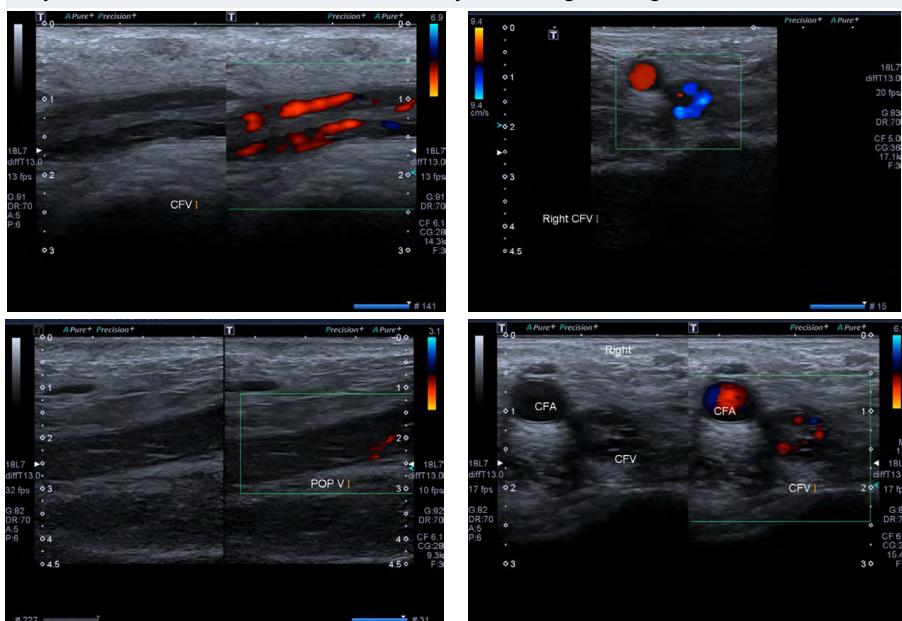
20 mins.

Figure 90 | Vascular: Case 4: This is a scintigraphy nuclear medicine result of a patient in a status post prolonged hypoxic injury, resulting in brain death. GPT-4V is able to identify that the images contain a series of sub-images, but it cannot perform temporal analysis. When text appears in the images, GPT-4V tends to prioritize OCR instead of image analysis, and here the OCR recognition is erroneous. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/brain-death-scintigraphy-1?lang=us>.

Vascular: Case 5

Prompt

Here is a 35-year-old female. Known case of cervical cancer, presented with bilateral lower limb swelling for two days. What is the affected area in the body according to the given information?



GPT-4V

These appear to be ultrasound images, specifically Doppler ultrasound images that show blood flow. The color-coded regions indicate the flow of blood in real time, with different colors typically representing the direction and speed of blood flow.

- The first image is labeled "CFV I," which may represent the Common Femoral Vein.
- The second image is labeled "Right CFV I," which is the Common Femoral Vein on the right side.
- The third image is labeled "POP V I," which could refer to the Popliteal Vein.

Reference answer

The affected area is the common femoral vein and popliteal vein bilaterally.

Prompt

Here is a 35-year-old female. Known case of cervical cancer, presented with bilateral lower limb swelling for two days. Is the material inside the vein completely blocking the blood flow?

GPT-4V

These images appear to be ultrasound scans, possibly of blood vessels given the presence of color flow (red and blue areas indicating blood flow direction). The acronyms like "CFV" and "POP V" could refer to specific blood vessels. However, without more context or clinical information, it's hard to provide a detailed interpretation.

Reference answer

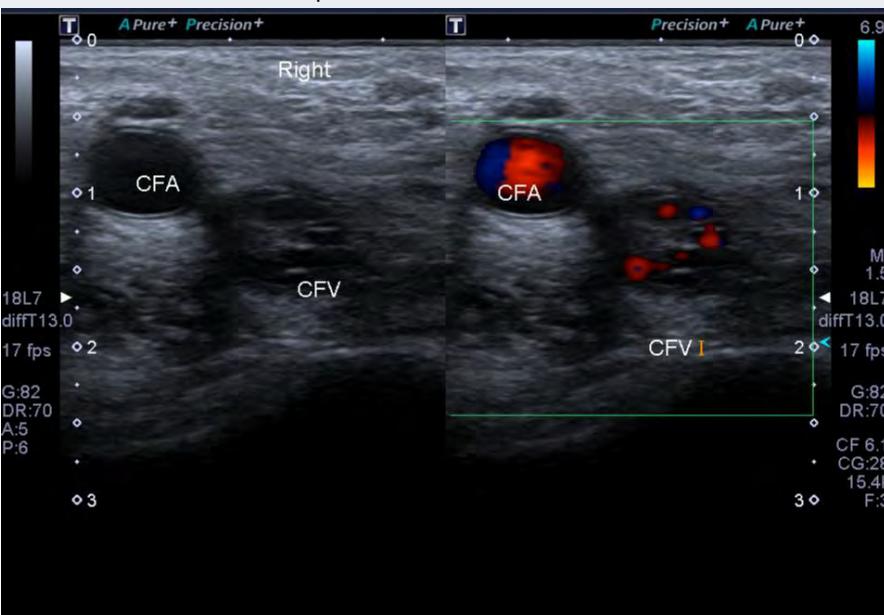
It is not completely blocking the blood flow because there is still some residual lumen showing color filling.

Figure 91 | Vascular: Case 5: This is an ultrasound of a patient with bilateral lower limb deep venous thrombosis. When text appears in the images, GPT-4V tends to ignore the content of the ultrasound and focus on the text. As a result, the overall analysis fails to yield useful conclusions. The original Radiopaedia case can be found in <https://radiopaedia.org//cases/bilateral-lower-limb-deep-venous-thrombosis?lang=us>.

Vascular: Case 5 Cont.

Prompt

What does this ultrasound express?



GPT-4V

The image you've provided appears to be a Doppler ultrasound, which visualizes blood flow within vessels. Here's what I can infer from the image:

Right: It indicates that the image is of the right side of the body (as opposed to the left side).

CFA: This likely stands for "Common Femoral Artery," which is a major artery in the leg that supplies blood to the lower extremity.

CFV: This most likely represents the "Common Femoral Vein," which is a large vein accompanying the Common Femoral Artery and is responsible for draining deoxygenated blood from the leg.

Color Doppler: The colored areas (especially the blue and red regions) represent blood flow. The colors typically indicate the direction of blood flow, with one color (often red) indicating flow towards the transducer, and the other color (often blue) indicating flow away from the transducer.

Settings & Measurements: On the left and right sides, there are various settings and measurements, such as "Precision+", "18L7", "diffT13.0", and others. These are likely settings and parameters used during the ultrasound scan. For instance, "18L7" might refer to the type of ultrasound probe used, and "diffT13.0" might be a setting or measurement related to the Doppler frequency or another parameter.

Reference answer

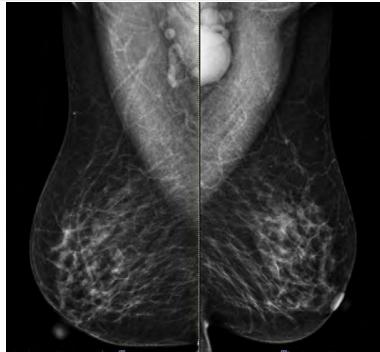
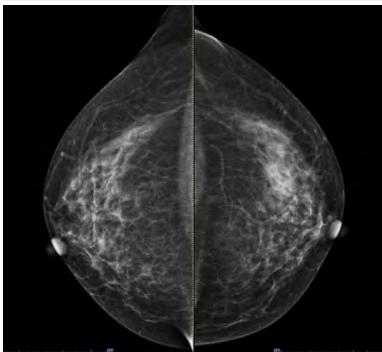
Bilateral common femoral vein and popliteal vein show heterogenously hypoechoic material within their lumen and can not be compressed fully. There is a little bit of residual lumen showing color filling.

Figure 92 | Vascular: Case 5 cont.: In this case, only a single image is inputted. We are attempting to have GPT-4V analyze what the ultrasound image conveys. However, when answering questions, it does not analyze the ultrasound itself. Instead, it focuses on interpreting the recognized text and explaining the meaning behind that text.

Oncology: Case 1

Prompt

Please generate a structural report according to these images.



GPT-4V

Patient Information: [Details not provided]

Technique: Bilateral mammography, craniocaudal (CC) and mediolateral oblique (MLO) views.

Findings:

Breast Composition: The breasts demonstrate heterogeneously dense breast tissue. This may reduce the sensitivity of mammography in detecting small masses or areas of architectural distortion.

Masses or Calcifications:

There are no overt dominant masses or areas of spiculated architectural distortion identified in the provided views.

No suspicious microcalcifications or clusters of microcalcifications are readily apparent.

Skin and Nipple:

No evidence of skin thickening or nipple retraction.

Lymph Nodes:

No overt axillary adenopathy is visible in the provided images.

Implants or Foreign Bodies: None identified.

Other Observations:

No other significant findings to report from the provided images.

Impression:

No suspicious findings are evident in the provided mammographic views.

Given the heterogeneously dense breast tissue, adjunct imaging such as breast ultrasound or MRI might be considered, especially if there is a palpable concern or if the patient is at increased risk.

Reference answer

There is focal asymmetry with architectural distortion in the upper outer quadrant of the left breast.

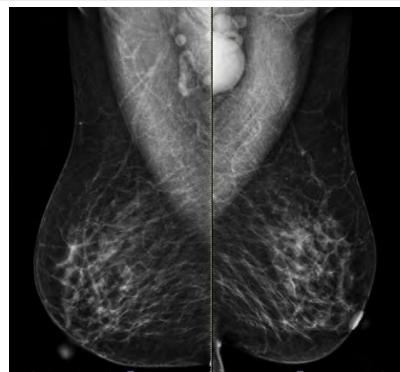
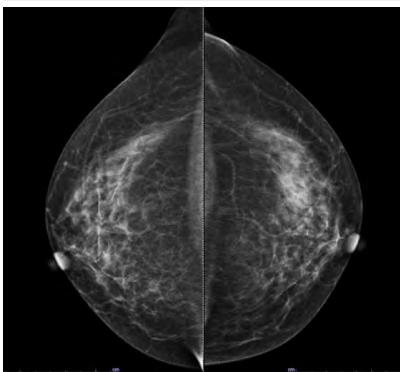
Left-sided enlarged lymph nodes.

Figure 93 | Oncology: Case 1. This case shows a Mammography modality report generation example of invasive ductal carcinoma. On the one hand, GPT-4V shows satisfying abilities to generate structural reports. On the other one hand GPT-4V suffers a hallucination that each part is normal. <https://radiopaedia.org//cases/invasive-ductal-carcinoma-17?lang=us>.

Oncology: Case 1 cont.

Prompt

Is there any sign of distortion in the upper outer quadrant of the left breast?



GPT-4V

I'm not a radiologist, but based on the images provided, there do appear to be areas of architectural distortion, particularly in the upper outer quadrant of the left breast. Architectural distortion can be seen as areas where the normal tissue structure appears to be pulled or distorted. However, it's crucial to note that any findings based on this interpretation should be confirmed by an expert radiologist in a clinical setting. Always seek a professional opinion for medical images and diagnoses.

Reference answer

There is focal asymmetry with architectural distortion in the upper outer quadrant of the left breast.

Prompt 2

Is there any signs of enlargement of the lymph nodes?

GPT-4V

Based on the mammographic images provided, the primary focus is on the breast tissue itself, and lymph nodes, particularly axillary lymph nodes, might not be as clearly visualized as they would be in other imaging modalities, like an ultrasound or MRI.

From the images you've provided, it's challenging to definitively comment on the status of the lymph nodes. However, if there are concerns about lymph node involvement, a targeted axillary ultrasound is commonly performed to better evaluate the lymph nodes for any signs of enlargement or other abnormalities.

Reference answer

Left-sided enlarged lymph nodes.

Figure 94 | Oncology: Case 1 cont. This case shows a Mammography modality VQA example of invasive ductal carcinoma. Compared with Case1, GPT-4V has relatively better performance in VQA task. <https://radiopaedia.org//cases/invasive-ductal-carcinoma-17?lang=us>.

Oncology: Case 2

Prompt

Can you find any mass shown in these images?



GPT-4V

From my assessment, there isn't an overtly obvious mass or lesion in the displayed radiographs. However, nuances and subtle findings can be missed without a clinical context and the expertise of a trained radiologist. If these images are of clinical concern, please have them reviewed by a medical professional in a clinical setting.

Reference answer

Soft tissue mass of the plantar aspect of the left foot, measuring 3.3 cm in the AP dimension.

Soft tissue mass of the left calf is incompletely imaged on this study.

Prompt 2

Can you find any mass shown in these images?



GPT-4V

I do not observe any overt masses, lesions, or significant abnormalities in the displayed radiographs.

Reference answer

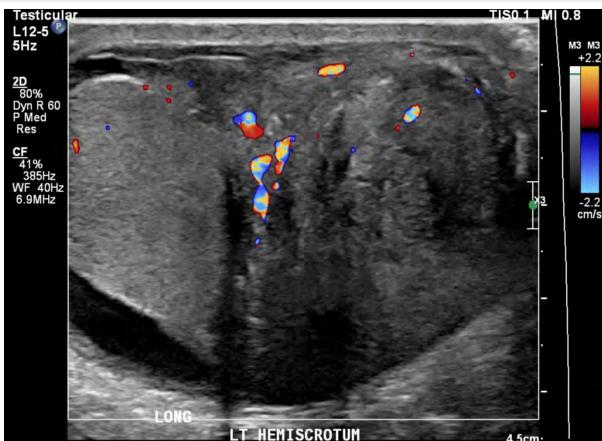
Large partially exophytic soft tissue mass of the left calf without underlying osseous erosion.

Figure 95 | Oncology: Case 2. This case shows a X-ray modality VQA example of malignant melanoma. Although the tumor is obvious in these X-ray images, GPT-4V still shows the hallucination of normality. <https://radiopaedia.org//cases/malignant-melanoma-2?lang=us>.

Oncology: Case 3

Prompt

Please generate a structural report according to this image.



GPT-4V

Findings:

Left Testicle:

The left testicle appears homogeneous on grayscale imaging.

There are multiple areas of color flow within the testicle, likely representing blood flow. The larger area of flow, especially the clustered regions, may represent vascular structures or abnormalities. Further correlation with patient history and clinical findings is needed to interpret the significance of this.

Epididymis:

No visible abnormalities.

Hydrocele or other fluid collection:

None visualized in the provided image.

Measurements:

Not provided in the current image.

Impression:

Left testicle shows multiple areas of increased vascularity. The clinical significance of this finding is uncertain based on the provided image alone. Correlation with patient's clinical history, physical examination, and possible additional imaging is recommended.

Reference answer

Within the left hemiscrotum, there is a hypoechoic paratesticular mass adjacent to the left testicle that demonstrates flow on color Doppler.

There is hydrocele within the left hemiscrotum.

Figure 96 | Oncology: Case 3. This case shows an ultrasound modality report generation example of spindle cell/sclerosing rhabdomyosarcoma of the testicle. Of the three observations, GPT-4V only gets one correct. <https://radiopaedia.org//cases/spindle-cellsclerosing-rhabdomyosarcoma-of-the-testicle?lang=us>.

Oncology: Case 3 cont.

Prompt

Here is the patient's history information:

On physical exam, a scrotal mass was palpated, which appeared to arise primarily from the left hemiscrotum.
Please regenerate a report for me.



GPT-4V

Findings:

Left Testicle:

The left testicle appears homogeneous on grayscale imaging.

Multiple areas of increased vascularity are visualized within the testicle, consistent with the site of the palpated scrotal mass. This vascular pattern may suggest a vascular lesion or tumor.

Epididymis:

No visible abnormalities.

Hydrocele or other fluid collection:

None visualized in the provided image.

Measurements:

Not provided in the current image.

Impression:

The left testicle shows multiple areas of increased vascularity correlating with the site of the palpated scrotal mass. Given the history and ultrasound findings, there's a suspicion for a vascular lesion or tumor within the left testicle. Biopsy or further imaging is recommended for definitive diagnosis.

Reference answer

Within the left hemiscrotum, there is a hypoechoic paratesticular mass adjacent to the left testicle that demonstrates flow on color Doppler.

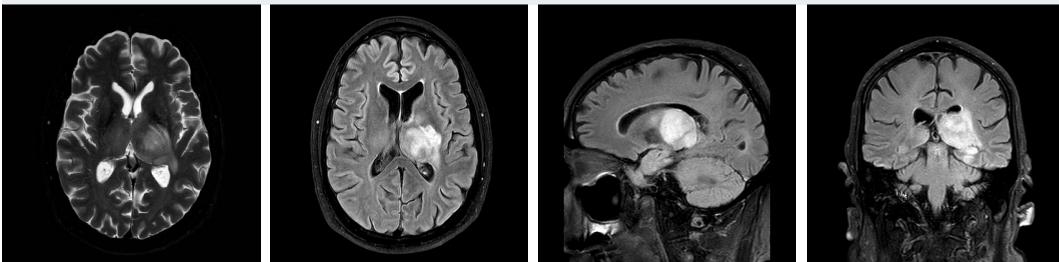
There is hydrocele within the left hemiscrotum.

Figure 97 | Oncology: Case 3 cont. This case shows an ultrasound modality report generation example of spindle cell/sclerosing rhabdomyosarcoma of the testicle. Compared with Case4, the patient's history is provided. Of the three observations, GPT-4V gets two correct. <https://radiopaedia.org/cases/spindle-cellsclerosing-rhabdomyosarcoma-of-the-testicle?lang=us>.

Oncology: Case 4

Prompt

Please generate a structural report according to these images.



GPT-4V

Findings:

Axial Image (first image):

The first image appears to show an axial section of the brain.

There seems to be a hyperintense lesion (bright area) located in the region of the right basal ganglia and extending toward the right lateral ventricle. This could represent various pathologies such as a **tumor**, cyst, or other lesion. The exact nature would require further evaluation and clinical correlation.

Sagittal Image (second image):

The second image provides a sagittal view of the brain.

Again, the lesion observed in the axial view is evident, extending from the region of the basal ganglia toward the lateral ventricle.

The corpus callosum, cerebellum, and brainstem appear within normal limits at this slice.

Coronal Image (third image):

The third image appears to be a coronal section of the brain.

The lesion in the right basal ganglia area is again evident. It appears hyperintense compared to surrounding brain tissue.

Ventricular system appears symmetrical, with no overt signs of hydrocephalus or midline shift.

Axial Image (fourth image):

Another axial image of the brain, possibly at a different sequence or weighting.

Bilateral basal ganglia and thalamus are visualized. The previously mentioned lesion is not as conspicuously bright in this image, suggesting it might be more evident on particular MRI sequences.

Impression:

A hyperintense lesion in the region of the right basal ganglia extending toward the right lateral ventricle is evident. The differential diagnoses include neoplastic lesions, vascular malformations, and certain types of cysts or **abscesses**, among others. Further imaging, such as contrast-enhanced sequences or other modalities, might be required for a more definitive diagnosis. Clinical correlation and a detailed evaluation by a radiologist are essential.

Reference answer

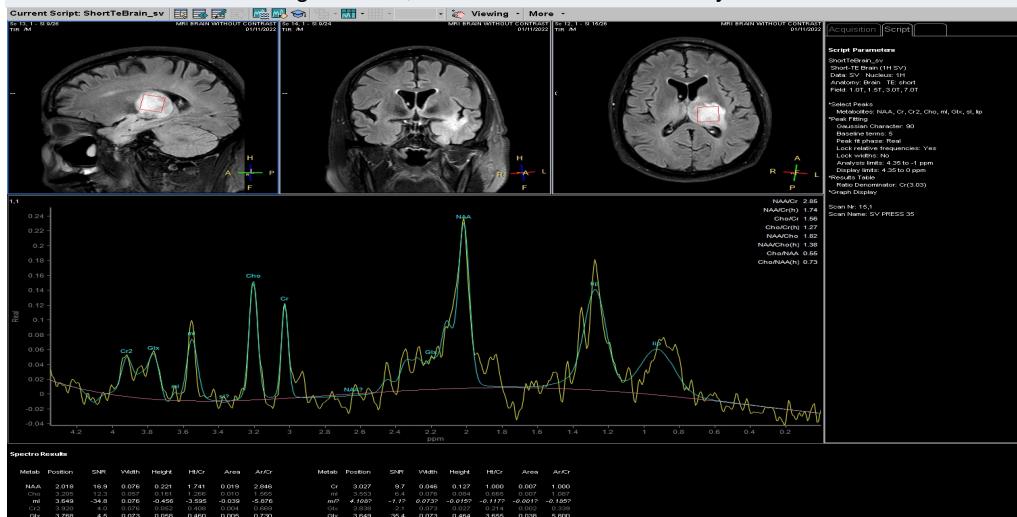
There is an ill-defined hyperintense T2/FLAIR signal mass within the left corona radiata and thalamus, with inferior extension of signal abnormality into the left optic radiation and left temporal stem. There is gyriform/subcortical hyperintense T2/FLAIR signal within the left medial and anterior temporal lobe. **There is evidence of local mass effect with effacement of the posterior body of the left lateral ventricle and third ventricle.**

Figure 98 | Oncology: Case 4. This case shows a MRI modality report generation example of thalamic glioblastoma. GPT-4V shows excellent discriminating ability of modal information. But when it comes to a precise analysis of symptoms and location, GPT-4V fails in this case. <https://radiopaedia.org//cases/thalamic-glioblastoma-1?lang=us>.

Oncology: Case 4 cont.

Prompt

This is MRS related to images above, what further conclusion can you derive?



GPT-4V

From the MRS graph:

The prominent peaks represent various brain metabolites:

NAA (N-Acetylaspartate): Typically a marker for neuronal health and density.

Cho (Choline): Often associated with cell membrane turnover.

Cr (Creatine): Usually a stable metabolite used as an internal reference in many MRS studies.

Glx: Represents glutamate and glutamine, involved in various brain functions including neurotransmission.

The provided table below the graph seems to show ratios of these metabolites to each other. Ratios can be helpful to detect abnormalities. For example, a reduced NAA/Cr ratio might suggest neuronal loss or dysfunction, while an increased Cho/Cr ratio might indicate increased cell membrane turnover, which can be seen in certain pathological conditions.

From the MRI images:

The areas marked with red rectangles might be the regions of interest where the MRS was acquired. The exact nature or any abnormality in these regions isn't clear from the provided images alone.

Conclusions:

The exact conclusion would ideally require a comprehensive understanding of the clinical context, patient history, and symptoms.

If there's any concern or specific observation about the ratios of metabolites or the MRI images, a consultation with a neuroradiologist or a neurologist would be crucial. They can provide a detailed interpretation in the context of the clinical scenario.

Reference answer

On MR spectroscopy, there is diminution in the NAA peak, decreased NAA/creatinine and NAA/choline ratios, and modest absolute elevations of choline and creatine peaks. There is no significant lipid-lactate elevation.

Figure 99 | Oncology: Case 4 cont. This case shows a MRI modality VQA example of thalamic glioblastoma. This image is well-annotated. GPT-4V shows good analytical capability for such images. However, fails in combining all the measures to reach a better conclusion. <https://radiopaedia.org//cases/thalamic-glioblastoma-1?lang=us>.

Oncology: Case 5

Prompt

What can you see from these three images?



GPT-4V

First Image (Axial Slice):

Thorax/Upper Abdomen: This image provides a cross-sectional view of the thorax and upper abdomen. There seems to be a structure (potentially a mass) adjacent to the heart, possibly involving the mediastinum or the upper lobe of the left lung. The exact origin and nature of this structure would require further clinical correlation.

Lungs: There are areas of increased opacity, potentially indicating regions of consolidation or masses.

Other Observations: there appears to be an area of increased density along the right lateral thoracic wall, suggestive of a possible pleural effusion.

Second Image (Coronal Slice):

Thorax: There is a clear presence of a structure or mass in the left thoracic region, anteriorly adjacent to the heart. This could potentially involve the lung or mediastinal structures.

Upper Abdomen: It seems that there is some form of heterogeneity or potential pathology in the liver. This may represent a lesion or area of altered attenuation.

Other Observations: a similar area of increased density is visible along the right lateral thoracic cavity. This again supports the possibility of a right pleural effusion.

Third Image (Sagittal Slice):

Thorax: The anterior mediastinal or lung mass is once again visible. Its craniocaudal extent can be better appreciated in this view.

Other Observations: The area of increased density along the right posterior thoracic wall might suggest fluid accumulation in the pleural space.

Reference answer

Large mass with necrotic foci at the right lung hilum, measuring 10.5 x 11.2 x ~20 cm (including a direct extension in the right lower lobe (RLL)). The mass insinuates into the posterior mediastinum, compressing the left atrium and esophagus; surrounds and compresses the right pulmonary veins; compresses the arteries to the right middle lobe (RML) and RLL; compresses and focally occludes the RML and RLL lobar bronchi, as well as segmental and subsegmental bronchi, and mildly compresses the right upper lobe (RUL) bronchus. Complete RML collapse. Large RLL consolidation and interstitial thickening in rest of lobe. Large right pleural effusion.

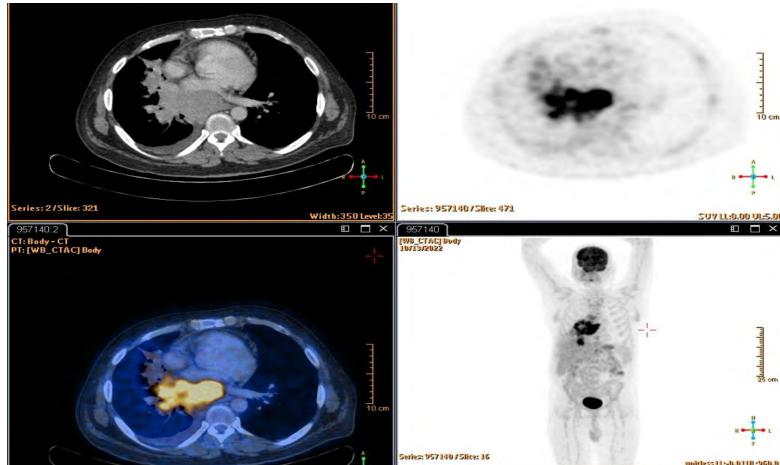
Several non-enlarged pancreaticoduodenal and peripancreatic lymph nodes.

Figure 100 | Oncology: Case 5. This case shows a CT modality VQA example of small cell lung cancer. This case shows the first image taken of the patient which GPT-4V performs well. <https://radiopaedia.org//cases/small-cell-lung-cancer-11?lang=us>.

Oncology: Case 5 cont.

Prompt

Please generate a structural report according to these images.



GPT-4V

Imaging Findings:

Axial CT of the Chest (upper left image):

There appears to be a well-defined mass in the mediastinum, anterior to the heart.

Lung fields appear clear without obvious consolidation or mass.

No overt rib fractures or chest wall abnormalities noted.

PET Scan (upper right and lower right images):

Hypermetabolic activity is evident in the mediastinal region, correlating with the mass seen on the CT. This suggests that the mass is metabolically active.

Multiple foci of increased uptake in the axial skeleton, which could be indicative of metastatic bone lesions.

Additional hypermetabolic activity is evident in the abdominal region.

Fused CT/PET (lower left image):

The fused image confirms the location of the metabolically active mediastinal mass adjacent to the heart.

It highlights the areas of uptake seen in the PET, providing anatomical context.

Preliminary Interpretation:

The mediastinal mass with increased metabolic activity on the PET scan is suspicious and may represent a primary malignancy or lymphoma. Its exact nature would need histological confirmation.

Multiple areas of increased uptake in the bones suggest possible metastatic disease.

The exact nature and origin of the other hypermetabolic lesions, especially in the abdomen, would require further characterization with dedicated imaging.

Reference answer

Significant regression of the primary mass and outstanding regression of the mediastinal-bihilar lymphadenopathy.

Massive mediastinal lymphadenopathy involving many stations

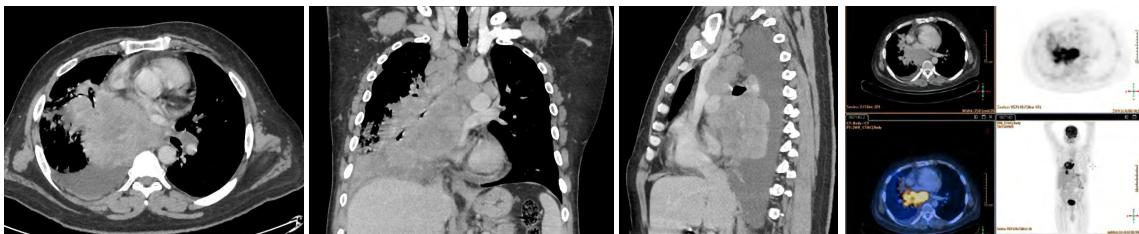
The pancreatic mass has enlarged and shows only mild-to-moderate radiotracer uptake.

Figure 101 | Oncology: Case 5 cont. This case shows a nuclear medicine(PET) & CT combined modality report generation example of small cell lung cancer. This case shows the second images taken of the patient after 3.5 months of treatment. In this case, GPT-4V shows strong multimodal-cognitive abilities in this case. <https://radiopaedia.org//cases/small-cell-lung-cancer-11?lang=us>.

Oncology: Case 5 cont.

Prompt

First three images were taken 3.5 months ago. Compared with the fourth image below, is the patient getting worse or better?



GPT-4V

Comparing medical images involves a detailed and nuanced evaluation, and while I can provide a general observational comparison based on the images you've shared, it's imperative to consult with a radiologist or appropriate medical professional for a definitive interpretation. Here's a broad overview based on the images:

From the image you provided and the above images:

Presence of Mass: The mass or structure in the mediastinal region or left lung seems to be consistent across both the initial and the recent images. If there is a change in size, it's not immediately evident from the images provided.

Lung Opacities: The areas of increased opacity in the lung fields, potentially indicating regions of consolidation or masses, appear to be present in both the initial and subsequent images. A direct comparison regarding their progression or regression is challenging without calibrated measurements.

Liver Heterogeneity: The heterogeneity or potential pathology in the liver was not evident in the initial image but appears in the later images. This suggests a possible new finding or progression, though the initial image might not have captured the same anatomical location as the later images.

Other Structures: Structures like the spine, vascular structures, and other organs do not show obvious changes between the two sets of images, at least from a general observational standpoint.

In summary, there seem to be consistent findings between the two sets of images, with a potential new or more pronounced finding in the liver in the later images. However, without calibrated measurements, specific sequences, and clinical context, it's challenging to definitively say if the patient's condition has worsened or improved.

Reference answer

Follow-up PET-CT done 3.5 months later, after several doses of chemotherapy, shows significant regression of the primary mass and outstanding regression of the mediastinal-bihilar lymphadenopathy. The RML is still collapsed.

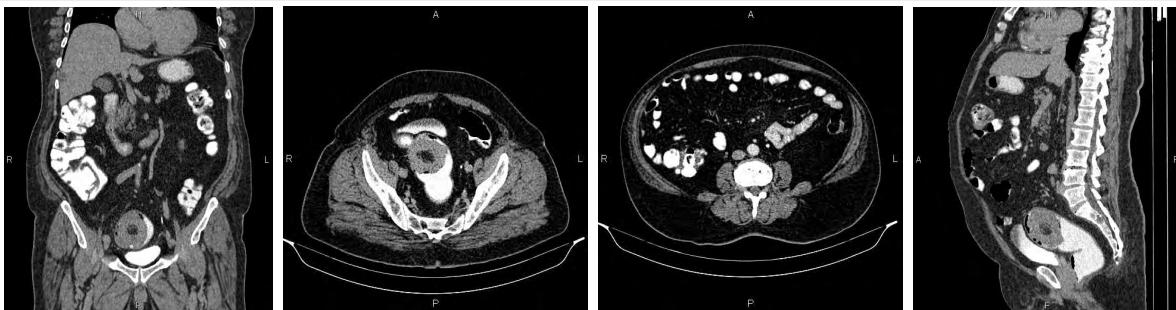
The pancreatic mass has enlarged and shows only mild-to-moderate radiotracer uptake.

Figure 102 | Oncology: Case 5 cont. This case shows a nuclear medicine(PET) & CT combined VQA generation example of small cell lung cancer. After 3.5 months treatment, there has been a marked improvement in the patient's condition. However, GPT-4V is poor at comparing images of different modalities to derive this conclusion. <https://radiopaedia.org//cases/small-cell-lung-cancer-11?lang=us>.

Oncology: Case 6

Prompt

Please generate a structural report according to these images, including analysis of colon, liver and prostate.



GPT-4V

Findings:

Colon:

The visualized portions of the colon demonstrate normal caliber without evidence of obstruction, focal mass, or wall thickening.

No colonic diverticula or signs of diverticulitis are identified.

No luminal narrowing or dilation is evident.

Liver:

The liver has a homogenous attenuation without evidence of focal lesions.

No intrahepatic bile duct dilatation is seen.

The hepatic vasculature, including the portal vein and hepatic arteries, appear patent and unremarkable.

No signs of cirrhosis or hepatic steatosis are identified.

Prostate gland:

The prostate gland appears normal in size and shape.

No focal masses or lesions are noted.

The capsule appears intact and no periprostatic invasion is evident.

Impression:

Colon: No evidence of colonic pathology based on the provided images.

Liver: No focal hepatic lesions or pathology identified.

Prostate gland: Normal appearance without evident pathology.

Reference answer

Asymmetrical increased wall thickness due to tumoral infiltration is present in the distal sigmoid colon, causing colocolic intussusception. Mild surrounding fat stranding is also observed.

A few small calcified foci are seen at liver parenchyma, most consistent with healed granuloma.

The prostate gland is enlarged.

Figure 103 | Oncology: Case 6. This case shows a CT modality report generation example of colocolic intussusception due to the tumoral infiltration. GPT-4V shows the hallucination of normality. <https://radiopaedia.org//cases/colocolic-intussusception-due-to-the-tumoural-infiltration-3?lang=us>

Trauma: Case 1

Prompt

Can you find any fracture patterns in the images?



GPT-4V

I can try to help, but please note that I'm not a substitute for a professional medical opinion. From the images provided:

The first image shows the **lateral view of the wrist**. I don't see any obvious fractures, but subtle fractures or other pathology might not be easily discernible.

The second image is another view of the wrist, likely **an anterior-posterior (AP) view**. Again, I don't see any obvious fractures.

The third image appears to be an AP view of the hand. I don't notice any obvious fractures in the metacarpals or phalanges.

Prompt

Please look more carefully. There exists fracture.

GPT-4V

I apologize for the oversight. Let me take another look.

The first image (lateral view of the wrist): There appears to be a disruption **in the distal radius's cortical line near the wrist joint, suggestive of a distal radial fracture.**

The second image (anterior-posterior view of the wrist): It's a bit more challenging to discern fractures **in this view, but based on your input and correlating with the lateral view, there might be a distal radial fracture.**

The third image (AP view of the hand): While the metacarpals and phalanges appear mostly intact, there's a possibility of a subtle fracture that I might be missing.

Given this, if these are indeed your images or those of someone you know, it's imperative to seek a professional medical opinion for proper evaluation and management.

Reference answer

Modality: X-ray.

Diagnosis: Radial styloid fracture

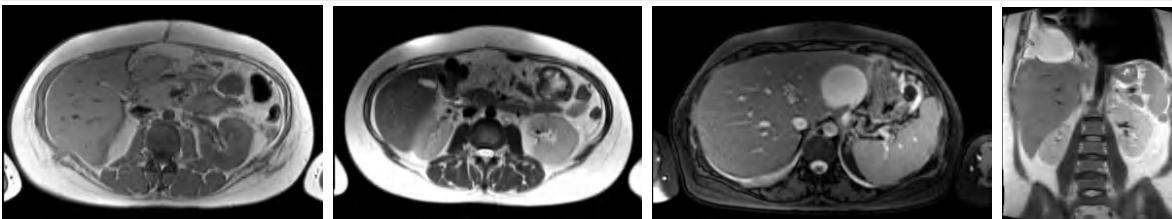
Description: Non-displaced fissure fracture at the base of the radial styloid process.

Figure 104 | Trauma: case 1. A typical fracture case in trauma system. GPT-4V fails to recognize the fracture patterns. After further hints, GPT-4V tries to find something abnormal but its given locations are still inaccurate or coarse. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/radial-styloid-fracture-8?lang=us>.

Trauma: Case 2

Prompt

Can you find any fracture patterns in the images?



GPT-4V

These images appear to be MRI scans. How can I assist you with them?

Prompt

Can you write a report for me?

GPT-4V

MRI Report

Patient: [Not provided]

Study: Abdominal MRI

Observations:

Liver: The liver parenchyma appears homogenous without evidence of focal lesions in the provided images.

Gallbladder: Not fully visualized in the provided images.

Pancreas: Appears normal without any visible lesions.

Spleen: The spleen appears normal in size and echogenicity.

Kidneys: Both kidneys are visualized. There are no apparent focal lesions or hydronephrosis.

Adrenal Glands: Not fully visualized in the provided images.

Stomach & Intestines: Not fully visualized but appear normal in the segments observed.

Bladder: Appears normal.

Pelvic Organs: Not fully visualized in the provided images.

Bones: The lumbar vertebrae and pelvic bones appear intact without signs of any lesions.

Miscellaneous: No free fluid or masses seen in the abdominal cavity in the images provided.

Impression:

No obvious abnormalities detected in the segments visualized in the provided images.

Some organs are not fully visualized, suggesting that a comprehensive assessment may require additional imaging sequences or views.

Reference answer

Modality: MRI

Diagnosis: Pancreatic transection

Description:

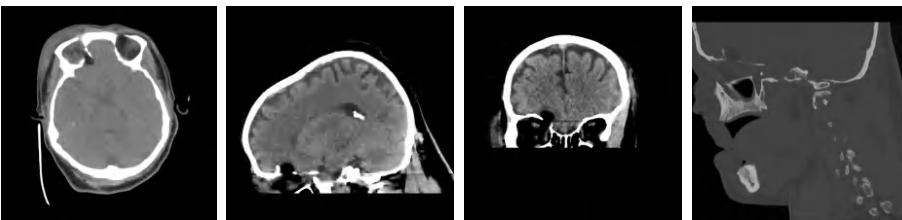
- Pancreatic injury (transection) involves the pancreatic body with a large amount of adjacent fluid, mainly filling the lesser sac.
- A bilateral pleural effusion, deep liver laceration and small gall bladder stone are noticed.

Figure 105 | Trauma: case 2. A MRI case with pancreatic transection. GPT-4V fails to find any abnormality. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/pancreatic-transection-8?lang=us>.

Trauma: Case 3

Prompt

Can you write a report for the patient?



GPT-4V

Radiological Report:

Patient: [Patient Name - Not Provided]

Date of Study: [Study Date - Not Provided]

Modality: Computed Tomography (CT)

Region: Head and Neck

Findings:

Brain CT:

The axial brain CT images demonstrate no evidence of acute intracranial hemorrhage, masses, or significant midline shift.

The ventricular system appears normal in size and configuration.

The grey-white differentiation appears preserved.

Neck CT:

The sagittal view of the neck shows normal alignment of cervical vertebrae.

No evidence of cervical vertebral fractures or dislocations.

Soft tissues of the neck appear unremarkable.

Impression:

No acute intracranial abnormality detected on the provided brain CT images.

Normal cervical spine alignment with no fractures or dislocations seen on the neck CT images.

Reference answer

Modality: CT

Diagnosis: Superior orbital blowout fracture

Description:

- There is a fracture of the right orbital roof superomedially with intracranial displacement of the fracture fragment. This fracture fragment demonstrates a trapdoor configuration with superomedial displacement. There is also herniation of orbital fat intracranially into the right anterior cranial fossa. The right superior rectus and levator palpebrae are displaced toward the fracture site, consistent with tethering. There is associated hemorrhage within the superior extraconal right orbit.
- There are comminuted bilateral nasal bone fractures with some fracture of the adjacent frontal processes of the maxilla. These result in slight leftward displacement of the nasal arch. There is overlying nasal soft tissue swelling.
- There is an obliquely oriented fracture involving the anterior medial aspect of the left maxillary sinus wall involving the anterior superior alveolar nerve. The fracture line extends through the left nasal lacrimal duct and extends into the frontal process of the maxilla. A nondisplaced fracture component posterior superiorly extends into the left lamina papyracea.

Figure 106 | Trauma: case 3. A CT case with superior orbital blowout fracture. Even though the fracture pattern in the images are clear, GPT-4V still think the patient to be normal with no fracture evidence. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/superior-orbital-blowout-fracture?lang=us>.

Trauma: Case 4

Prompt

May you please find something abnormal from the images?



GPT-4V

You've provided X-ray images of a hand. How can I assist you with them?

Prompt

Analyze them please.

GPT-4V

From the provided X-ray images:

- Both images depict the hand, showing phalanges (finger bones), metacarpals (bones of the hand), and the carpal bones (wrist bones).
- In the images, there appear to be some type of fixative hardware (like pins or screws) placed in the region of the wrist, specifically in the area of the radius, one of the two main bones of the forearm. This suggests a previous surgical intervention, possibly due to a fracture or another orthopedic issue.
- The bone density appears to be consistent throughout, without evident lytic (dark) or sclerotic (bright) lesions that might indicate certain pathologies.
- No evident dislocations or misalignments of the joints are visible in the provided images.

Reference answer

Modality: X-ray

Diagnosis: Volar plate avulsion injury

Description:

- There is a volar plate avulsion injury of the volar aspect of the middle phalanx of the ring finger. There is no associated dislocation or subluxation of the PIP articulation. There is well-identified soft tissue swelling.

Figure 107 | Trauma: case 4. A X-ray case with volar plate avulsion injury. GPT-4V cannot find any evidence corresponding to fracture. Besides, it also seems to recognize the necklace as some medical surgery device. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/volar-plate-avulsion-injury-8?lang=us>.

Trauma: Case 5

Prompt

The images are shot for a 50-year-old man. Please write a report for him.



GPT-4V

You've provided X-ray images of a hand. How can I assist you with these?

Prompt

Please write a report for him.

GPT-4V

X-ray Report: Hand

Patient: Unknown

Date: [Insert Date]

Findings:

The X-ray images provide an anteroposterior (AP) and oblique views of the hand.

The bones visualized include the phalanges, metacarpals, and a portion of the carpal bones.

The alignment of the phalanges and metacarpals appears intact.

The joint spaces are preserved and appear uniform.

The cortical outline is smooth, and no obvious fractures or dislocations are appreciated.

There are no evident signs of osteolytic or osteoblastic lesions.

Soft tissue structures are not well-defined in X-ray imaging, but no obvious soft tissue swelling or masses are apparent.

Impression:

No acute bony abnormalities.

No signs of fractures, dislocations, or notable degenerative changes.

Reference answer

Modality: X-ray

Diagnosis: Mallet fingers

Description: There are dorsal bony avulsions of the base of the terminal phalanges of the right 3rd and 4th digits.

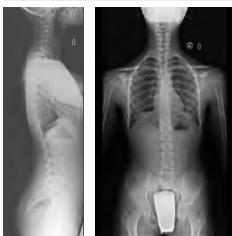
There is an intraarticular extension (DIP). These are best visualized on the lateral views.

Figure 108 | Trauma: case 5. A X-ray case with bony avulsions. GPT-4V can successfully recognize the images as hand X-rays while it misses the signs of bony avulsions totally. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/mallet-fingers-1?lang=us>.

Paediatrics: Case 1

Prompt

Can you write a report about the patient?



GPT-4V

Radiological Report:

Patient: [Not Specified]

Date of Study: [Not Specified]

Type of Study: X-ray Imaging

Clinical Information: [Not Provided]

Findings:

Cervicothoracic Spine Lateral View:

The cervical and upper thoracic vertebrae appear to be in alignment.

Intervertebral disc spaces appear preserved.

No obvious bony abnormalities are seen in the visualized cervical and thoracic segments.

Anteroposterior View of Thorax and Abdomen:

The lungs are well-aerated without any obvious focal lesions.

The heart size and shape appear within normal limits.

The visualized bony thorax including the ribs and thoracic vertebrae appear unremarkable.

The visualized portion of the abdomen reveals no significant radiographic abnormalities.

The pelvis appears symmetrical, and the hip joints appear unremarkable.

Impression:

No significant radiological abnormalities detected in the provided images.

Reference answer

Modality: X-ray (paediatrics).

Diagnosis: Scheuermann's disease

Description: Vertebral wedging, subchondral osseous irregularity in the endplates, Schmorl's nodes and an asymptomatic thin cleft in the neural arch of the fifth lumbar vertebra. There's also hypoplasia of the left iliac bone and mild hypoplasia of the ipsilateral proximal femur.

Figure 109 | Pediatrics: case 1. A scheuermann's disease X-ray case. GPT-4V can distinguish the modality and anatomy while it recognize the images to be normal. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/scheuermanns-disease-8?lang=us>

Paediatrics: Case 1 cont.

Prompt

This is a 10-year-old male adolescent with lower back pain. Can you write a report according to his X-rays?



GPT-4V

X-Ray Report: Spine

Patient: 10-year-old male adolescent

Clinical Information: Presented with lower back pain.

Technique: Anteroposterior (AP) and lateral views of the lumbar spine were obtained.

Findings:

Alignment: The vertebral bodies are in anatomical alignment with no subluxation or listhesis observed.

Bone Density and Structure: Bone density appears normal for age. No fractures or lytic lesions are appreciated.

Intervertebral Disc Spaces: Disc spaces appear maintained. No significant disc space narrowing is evident.

Soft Tissues: Paraspinal soft tissues appear unremarkable.

Other Observations: No other significant abnormality noted in the visible portions of the thoracic and pelvic region.

Impression:

Normal alignment and structure of the lumbar spine for a 10-year-old male adolescent.

No radiographic evidence of fracture, spondylolisthesis, or other significant abnormality.

Reference answer

Modality: X-ray (paediatrics).

Diagnosis: Scheuermann's disease

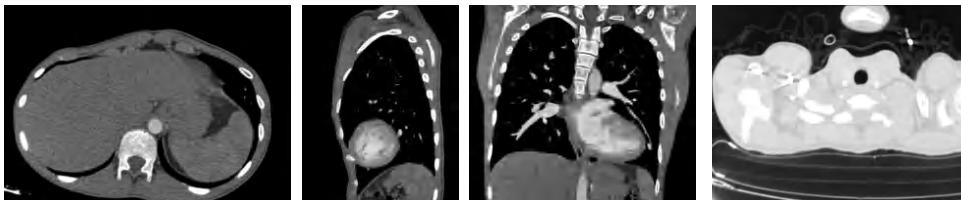
Description: Vertebral wedging, subchondral osseous irregularity in the endplates, Schmorl's nodes and an asymptomatic thin cleft in the neural arch of the fifth lumbar vertebra. There's also hypoplasia of the left iliac bone and mild hypoplasia of the ipsilateral proximal femur.

Figure 110 | Pediatrics: case 1 cont. Considering the patient is a 10-year-old boy that may lead to differences in X-ray images, we try to give GPT-4V more patient information, like patient background and his symptoms. However, thought GPT-4V will list the context in its response, it still tends to say the patient is normal. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/scheuermanns-disease-8?lang=us>.

Paediatrics: Case 2

Prompt

May you please write a report to analyze the CTs from a certain patient?



GPT-4V

The images you've shared appear to be CT (computed tomography) scans. How can I assist you with these?

Prompt

Please write a report about the patient.

GPT-4V

Based on the images you've provided, here is a general description:

1. Axial Slice of the Abdomen:

1. Liver: Appears of regular density. No visible focal lesions at the given slice.
2. Kidneys: Not fully visualized in the provided slice.
3. Spleen, pancreas, and adrenal glands: Not fully visualized in the provided slice.
4. Aorta and Inferior Vena Cava: Visible and appear patent.
5. Bones: No obvious fractures or lesions are seen in the vertebral bodies or ribs.

2. Coronal Slice of the Thorax:

1. Lungs: Show clear lung fields without visible masses or consolidations in the provided slice.
2. Heart: Appears within normal size and shape.
3. Mediastinum: No obvious masses or lymphadenopathy.
4. Bones: The vertebral bodies and ribs appear intact without obvious lesions.

3. Sagittal Slice of the Thorax:

1. Lung fields appear clear without visible masses or consolidations.
2. Diaphragm: Appears intact and in its expected curvature.
3. Bones: The vertebral bodies appear intact. No visible compression fractures or bony lesions.

Reference answer

Modality: CT (paediatrics).

Diagnosis: Congenitally corrected transposition of great arteries (L-TGA)

Description:

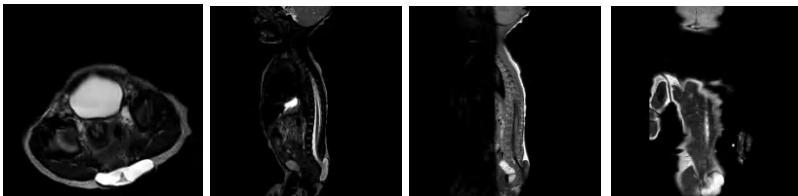
- A CT scan reveals a dilated pulmonary artery and its branches, with the pulmonary trunk located on the right side in a parallel course with the ascending aorta.
- The left ventricle is markedly dilated and shows a moderator band (morphologically, the right ventricle).
- Multiple small VSD membranous and muscular types.
- The rest of the major cardiac vessels are normally related anatomically to their corresponding chambers.
- Overall features consistent with L-TGA

Figure 111 | Pediatrics: case 2. A CT case for the pediatrics system. In the first query, GPT-4V ignores the text totally. In the second query, it misses the abnormal size of the patient's heart totally. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/congenitally-corrected-transposition-of-great-arteries-l-tga?lang=us>.

Paediatrics: Case 3

Prompt

This is a 1-day new-born female patient. Can you write a report for her?



GPT-4V

MRI Report

Patient: 1-day new-born female

Date of Examination: [Insert Date Here]

Clinical Indication: Not provided.

Technique: MRI of the cervical, thoracic, lumbar spine, and brain. Multiple sequences and planes were obtained.

Findings:

Cervical Spine:

The vertebral bodies, intervertebral discs, and posterior elements appear normal in alignment and morphology.

The spinal cord shows normal caliber and signal characteristics.

No evidence of masses or abnormal enhancement.

Thoracic Spine:

The vertebral bodies, intervertebral discs, and posterior elements are in normal alignment.

No evidence of cord compression or intradural extramedullary lesions.

The spinal cord has a normal signal and caliber.

Lumbar Spine:

Normal alignment of the vertebral bodies without spondylolisthesis.

No evidence of intrathecal masses or abnormal enhancement.

Brain:

The cerebral hemispheres show symmetric signal intensity without infarction, hemorrhage, or mass effect.

The ventricular system is of normal size and configuration.

Midline structures are unremarkable.

The cerebellum and brainstem appear normal.

Impression:

No acute osseous abnormalities of the cervical, thoracic, or lumbar spine.

No intracranial hemorrhage, mass effect, or abnormal enhancement within the brain.

Reference answer

Modality: MRI (paediatrics).

Diagnosis: Myelomeningocele

Description: At the level of S3-S4, there is a defect in the spinal canal with protrusion of the spinal cord membranes and the formation of a herniated sac containing cerebrospinal fluid, part of the spinal cord, and spinal nerve roots.

Figure 112 | Pediatrics: case 3. A MRI case with myelomeningocele. Though GPT-4V tries to describe the spine, it again does not find anything suspicious. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/myelomeningocele-6?lang=us>.

Paediatrics: Case 4

Prompt

This is a 2-month new-born female baby patient. May you please write a report for her?



GPT-4V

Ultrasound Report

Patient Details:

- Age: 2 months
- Gender: Female

Study Type: Pelvic Ultrasound with Doppler

Findings:

1.Ovaries: The right ovary (RT OV) appears in longitudinal (Long) view. Specific size and morphology are difficult to delineate from the provided image alone. The presence of color Doppler suggests some vascular flow within or near the ovary, which is typical. No significant cystic or solid masses are evident in this limited view.

2.Doppler: There is evidence of color Doppler flow, which suggests vascular activity. The nature and significance of this flow, such as whether it represents normal or abnormal vascular patterns, cannot be determined from this single image alone.

3.Surrounding Structures: The surrounding pelvic anatomy is not clearly visible in this image, and it is not possible to comment on the status of other pelvic structures without additional images or clinical context.

4.Miscellaneous: Various ultrasound settings are visible in the image (e.g., frequency, resolution, power). These settings are typical of pelvic ultrasound examinations but do not provide specific information about the patient's anatomy or pathology.

Conclusion: The right ovary shows normal vascular flow on Doppler, with no evident cystic or solid masses in the limited view provided. Additional images and clinical correlation are recommended for a comprehensive evaluation.

Reference answer

Modality: Ultrasound (paediatrics).

Diagnosis: Incarcerated inguinal hernia containing ovary

Description: In the left labia majora, there is an ovoid structure. This is predominantly echogenic solid tissue although there is at least one small cystic structure within this structure. There is a tiny amount of adjacent free fluid. Color Doppler imaging shows a small amount of flow within this structure.

Prompt

Can you find something abnormal in the left labia majora?

GPT-4V

Based on the provided ultrasound image:

The left labia majora is not distinctly visible in this specific image. The ultrasound appears to be focused on the right ovary, and surrounding structures are not clearly delineated. Without a clear view or additional images that specifically focus on the left labia majora, it is not possible to make any definitive statements regarding its appearance or to identify any abnormalities.

Reference answer

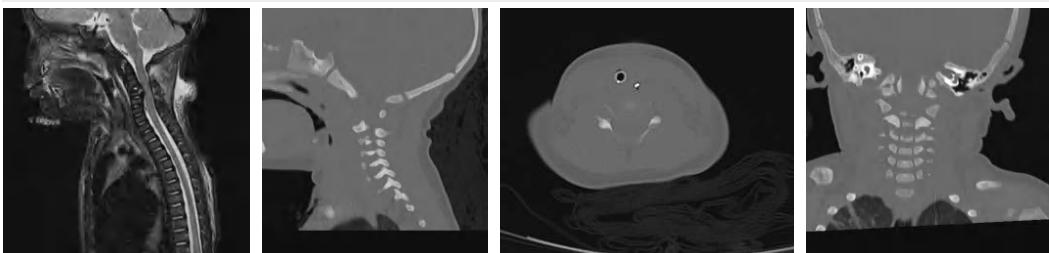
In the left labia majora, there is an ovoid structure. This is predominantly echogenic solid tissue although there is at least one small cystic structure within this structure.

Figure 113 | Pediatrics: case 4. An ultrasound case. GPT-4V can understand the color annotation on the ultrasound image. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/incarcerated-inguinal-hernia-containing-ovary?lang=us>.

Paediatrics: Case 5

Prompt

These are three images from a 3-month-old female baby. May you please write a report according to them?



GPT-4V

Radiological Report:

Patient: 3-month-old female

Study: MRI and CT Imaging of the Cervical Spine and Head

Findings:

Image 1 (MRI of the Cervical Spine in Sagittal view):

The vertebral bodies appear aligned.

The intervertebral disc spaces appear maintained.

No significant soft tissue abnormalities are noted.

The spinal cord has a normal signal intensity, and no cord compression is seen.

Image 2 (CT Axial view of the Head):

Normal shape of the skull vault.

No evidence of fractures or bony deformities.

Brain parenchyma appears unremarkable with no evidence of masses or hemorrhages on this slice.

Image 3 (CT Sagittal view of the Cervical Spine):

Vertebral alignment appears normal.

No visible vertebral fractures or bony abnormalities.

Normal lordotic curvature is observed.

Prevertebral soft tissues appear unremarkable.

Image 4 (CT Coronal view of the Head and Upper Cervical Spine):

Normal shape and bony architecture of the skull.

No evidence of bony lesions or fractures.

The cervical spine appears aligned with no visible bony abnormalities.

Impression:

No acute radiological findings on the provided slices.

Further evaluation with complete imaging sequences and consultation with a pediatric radiologist is recommended for a comprehensive assessment.

Reference answer

Modality: MRI and CT (the latter three)

Diagnosis: C2 and C3 fractures (infant)

Description:

- (MRI) Burst fracture of C3 with retropulsion of the posterior vertebral body wall into the spinal canal. There is severe spinal stenosis and T2 hyperintensity of the cord at this level. Increased T2 hyperintensity of the posterior ligamentous complex.
- (CT) Lucencies are seen through the pedicles of C2 bilaterally. Alignment is normal. Disc heights are normal. There is no canal stenosis.

Figure 114 | Pediatrics: case 5. A pediatrics case combined of CT and MRI. GPT-4V successfully points out the imaging modality for each images while it predicts the case as a normal case again. The original Radiopaedia case can be found in <https://radiopaedia.org/cases/c2-and-c3-fractures-infant-2?lang=us>.

Urogenital: Case 1

Prompt

The patient has pneumaturia and passage of urine rectally history of diverticulitis. Please generate a structural report according to these images.



GPT-4V

Findings:

Lumbar Spine:

The lumbar vertebral bodies are well-aligned.

The intervertebral disc spaces appear preserved.

No evident fracture, subluxation, or spondylolisthesis.

Facet joints and pedicles are intact.

Soft tissues appear unremarkable.

Pelvis:

The iliac wings are symmetrical with no evident fracture or bony lesion.

Both hip joints are intact without any evident dislocation.

Acetabular roofs are well-preserved.

The pubic symphysis is aligned, and the sacroiliac joints are symmetric.

A round radiopaque structure is visualized, which might represent a catheter or other medical instrument. Its purpose or relevance would be better determined with clinical correlation.

Sacrum and Coccyx:

No visible fracture or malalignment.

Soft Tissues:

The visible soft tissues of the abdomen and pelvis appear unremarkable.

Impression:

No acute bony abnormality detected in the lumbar spine or pelvis.

Radiopaque structure likely represents a catheter or medical instrument, clinical correlation recommended.

Reference answer

On non-contrast image, a DJ stent is inserted on the right side in appropriate position. Several stones are seen in the lower part of the right renal lobe.

After contrast media injection via a Foley catheter, the urinary bladder is visualized, accompanied by bilateral vesicoureteral reflux.

In addition, evidence of fistulous formation is observed between the posterior aspect of the urinary bladder and the adjacent rectosigmoid junction.

Figure 115 | Urogenital: Case 1. This case shows a fluoroscopy modality report generation example of colovesical fistula due to diverticulitis. In this case, GPT-4V keeps satisfying abilities to identify medical devices well. However, despite the availability of images from all views, it is still unable to identify pathological abnormalities in the images. <https://radiopaedia.org//cases/colovesical-fistula-due-to-diverticulitis?lang=us>

Urogenital: Case 1 cont.

Prompt

Generally check these images, can you see signs of stones in the lower part of the right renal lodge?



GPT-4V

Based on the provided X-ray images, I can attempt to identify any radiopaque areas that might suggest the presence of stones in the right renal lodge. Remember, not all renal stones are radiopaque; some may not be visible on standard radiographs.

Upon inspection, I cannot definitively identify any obvious radiopaque stones in the region of the right renal lodge.

Reference answer

On non-contrast image, a DJ stent is inserted on the right side in appropriate position. Several stones are seen in the lower part of the right renal lodge.

Prompt

Can you see bilateral vesicoureteral reflux?

GPT-4V

In the images you provided, there appears to be radiopaque material (likely contrast) present in the bladder. I can observe some opacification extending upwards from the bladder, which could suggest the presence of vesicoureteral reflux. This is more evident on the image labeled "Right", though there is some suggestion on the other images as well.

Reference answer

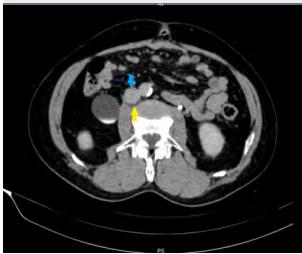
After contrast media injection via a Foley catheter, the urinary bladder is visualized, accompanied by bilateral vesicoureteral reflux.

Figure 116 | Urogenital: Case 1 cont. This case shows a fluoroscopy modality report generation example of colovesical fistula due to diverticulitis. Compare with the report generation case, GPT-4V performed slightly better on VQA tasks. <https://radiopaedia.org//cases/colovesical-fistula-due-to-diverticulitis?lang=us>.

Urogenital: Case 2

Prompt

In the image, what is the location indicated by the blue arrow and what anomaly does the yellow arrow point to?



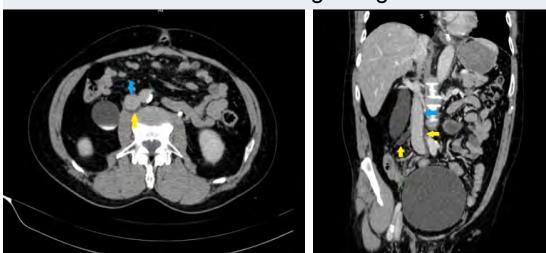
GPT-4V

The location indicated by the blue arrow seems to point to the aorta, which is the main and largest artery in the body, carrying blood away from the heart.

The yellow arrow seems to point to the anterior aspect of a vertebral body, specifically the lumbar spine region. Based on the image alone, it is challenging to provide a specific diagnosis. However, the region appears to have an abnormal density compared to the surrounding structures. It could represent a variety of pathological processes, such as a vertebral body fracture, lytic lesion, or an infectious process among others.

Prompt

Now consider these two images together and answer my question above again.



GPT-4V

The blue arrows in both axial and sagittal images seem to point towards the inferior vena cava (IVC), which is the large vein that carries de-oxygenated blood from the lower body back to the heart.

The yellow arrows in both the axial and sagittal views appear to point to an anterior vertebral body compression fracture, likely in the lumbar spine. The vertebral body looks compressed anteriorly compared to its neighboring vertebrae.

Reference answer

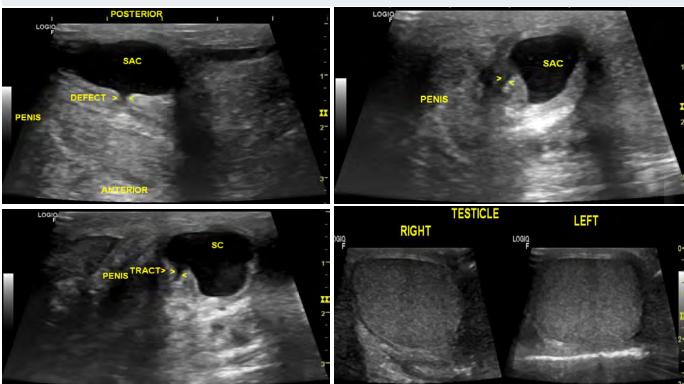
Yellow arrows show the abnormal course of the right ureter passing behind the inferior vena cava (IVC) and emerging between the IVC and aorta. Blue arrows point to the IVC.

Figure 117 | Urogenital: Case 2. This case shows an annotated CT modality VQA example of right circumcaval (retro caval) ureter - type 1. For the same system, GPT-4V shows better response quality after given two angles compared with the annotated image given only a single perspective. <https://radiopaedia.org//cases/right-circumcaval-retrocaval-ureter-type-1-1?lang=us>.

Urogenital: Case 3

Prompt.

Please generate a structural report according to these images.



GPT-4V

Findings:

First Image:

The image demonstrates a part of the scrotum with an area labeled as "SAC".

There appears to be a focal area labeled as "DEFECT".

The penis is also visualized anteriorly.

The exact nature and implications of the "DEFECT" are **not clear from this single image**.

Second Image:

This image shows an anatomical region labeled as the "PENIS" with an associated "TRACT".

The scrotal contents labeled as "SC" are also visualized.

There's **no obvious pathology identified in this image**.

Third Image:

The image provides a view of the "PENIS" and an associated "SAC".

No obvious abnormalities are observed in this view.

Fourth Image:

Bilateral testicles are shown in transverse orientation.

The right testicle appears homogenous with no visible masses or cysts.

The left testicle also appears homogenous. There's a hyperechoic linear structure visible, which might represent a vessel or an artifact. **No obvious masses or cysts are observed.**

Impression:

The sonographic images of the scrotum demonstrate no obvious pathology. The area labeled as "DEFECT" in the first image requires clinical correlation for further interpretation. Bilateral testicles appear to be of normal sonographic appearance without any obvious masses or cysts.

Reference answer

Both testes and epididymides have normal appearance. No scrotal masses or hydrocele.

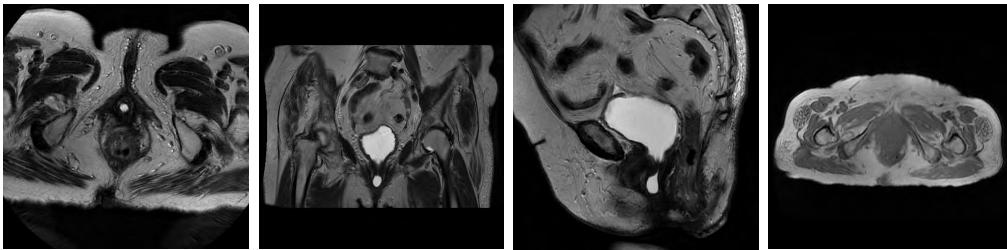
A sac like fluid-filled protrusion with subtle debris is noted at the posterior aspect of the penile base. The sac appears to have a blind ended tract probably leading into the urethra.

Micturating cystourethrography (MCU) was recommended for further assessment.

Urogenital: Case 4

Prompt

Please generate a structural report according to these images.



GPT-4V

First Image:

Axial T2-weighted MR image of the pelvis.

Muscles appear symmetric with no visible pathological changes.

Bony structures are well defined and seem to be intact.

Central pelvic organs including the bladder, prostate in males, or uterus in females (can't discern from this slice) are identifiable.

Second Image:

Coronal T2-weighted MR image of the pelvis.

The sacroiliac joints are identifiable and appear unremarkable.

Symmetric muscle structures with no overt sign of atrophy or hypertrophy.

Central pelvic structures including rectum and possibly parts of the sigmoid colon are seen.

Third Image:

Sagittal T2-weighted MR image of the pelvis.

The sacrum and coccyx bones are identifiable.

The pubic symphysis is seen anteriorly.

Posterior muscles of the pelvis are visualized without any obvious pathological signal.

Fourth Image:

Axial T1-weighted MR image of the pelvis.

Muscles show a typical low to intermediate signal on T1, appearing normal.

Bony pelvis and hip joints are visualized with no evident abnormalities.

No overt masses or pathological fluid collections are discerned.

Reference answer

Patient post total abdominal hysterectomy and bilateral salpingo-oophorectomy.

There is prolapse of the posterior urinary bladder floor at the level of the vagina, mildly indenting and displacing the urethra anteriorly. Fluid signal is at this level, measuring $1.7 \times 1.3 \times 1.1$ cm.

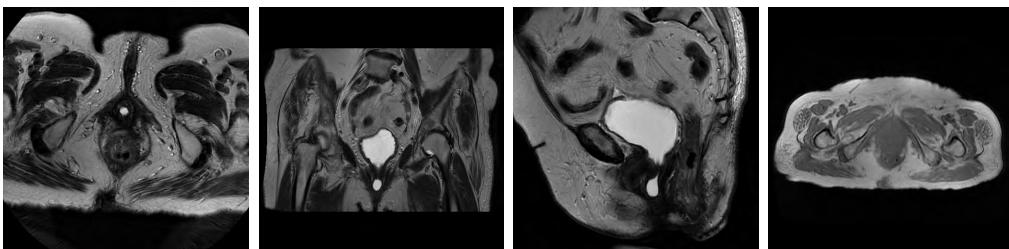
Focal outpouching noted in the superior bladder wall, measuring 0.9×0.8 cm, and likely pertaining to a small urachal diverticulum.

Figure 119 | Urogenital: Case 4. This case shows a MRI modality report generation example of cystocele. GPT-4V shows excellent modal recognition ability, but lacks the ability to analyze pathology. <https://radiopaedia.org//cases/urethral-diverticulum-10?lang=us>.

Urogenital: Case 4 cont.

Prompt

Are these pictures showing the bladder?



GPT-4V

Based on the anatomy visualized:

The first image seems to show an axial slice of the pelvic region, and the structure in the center of the image has the typical appearance of the bladder.

The second image is a coronal slice of the pelvic region, and again, the central structure is consistent with the appearance of the bladder.

The third image looks like a sagittal section, and the prominent structure in the center is also indicative of the bladder.

The fourth image is another axial section, and the bladder is seen in the middle.

So, yes, the images do seem to prominently display the bladder among other pelvic structures.

Reference answer

Yes.

Prompt

Can you note focal outpouching in the superior bladder wall?

GPT-4V

In the first image (axial view), there might be a suggestion of an outpouching or irregularity in the superior aspect of the bladder. However, the axial view may not be the best to appreciate this.

The second image (coronal view) provides a clearer view of the superior bladder wall, and there appears to be a focal outpouching or protrusion in the superior aspect of the bladder.

The third image (sagittal view) also shows a structure consistent with a focal outpouching in the superior aspect.

The fourth image (another axial view) seems to show the bladder at a slightly different level and does not provide a clear view of the superior bladder wall as the previous slices.

That said, the focal outpouching in the superior bladder wall, which might be suggestive of a diverticulum or another anatomical variant, seems most evident in the second (coronal) image.

Reference answer

Focal outpouching noted in the superior bladder wall, measuring 0.9 x 0.8 cm, and likely pertaining to a small urachal diverticulum.

Figure 120 | Urogenital: Case 4 cont. This case shows a MRI modality VQA example of cystocele. Compared with the report generation task, GPT-4V shows better recognition ability in this case. <https://radiopaedia.org//cases/urethral-diverticulum-10?lang=us>

Urogenital: Case 5

Prompt

Can you see any signs of mass or stones?



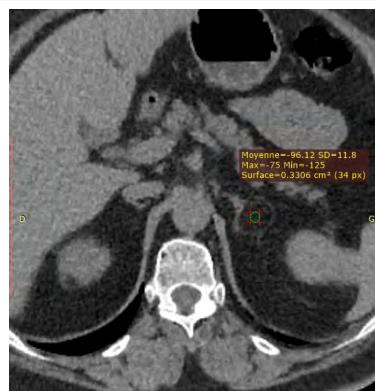
GPT-4V

As for the presence of a mass: I do not observe any obvious masses in the displayed region. However, it's important to note that detecting a mass or any other pathology requires a detailed review of multiple imaging slices, preferably by a trained radiologist, to reach a conclusive diagnosis.

Regarding stones: No overt radiopaque (bright on the CT scan) stones, such as those that might be found in the gallbladder or kidneys, are immediately apparent in this image slice. However, as with masses, making a definitive statement requires a comprehensive review of the entire set of images.

Prompt

Now given this annotated image,
please regenerate the answer.



GPT-4V

Regarding the presence of a mass: The circled area suggests a region of interest, and it appears to highlight a slightly hypodense (darker) region within the liver. This could potentially be a mass or a cyst, but the exact nature of it would require further evaluation with other imaging slices and possibly other modalities or even a biopsy for definitive diagnosis.

Regarding stones: I still do not observe overt radiopaque stones in this particular image slice.

Reference answer

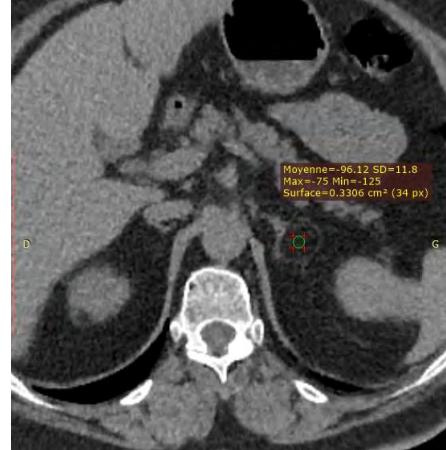
Left renal mass of fatty attenuation (mean density = -96 HU). No renal, ureteric or bladder stone.

Figure 121 | Urogenital: Case 5. This case shows a CT(Annotated or not) modality VQA example of adrenal myelolipoma. When only the original CT image is given, GPT-4V can only correctly answer the question of whether there are stones, and adding annotated CT images on this basis can not only keep the stone question answered correctly, but also correctly answer the mass existing question. <https://radiopaedia.org//cases/adrenal-myelolipoma-57?lang=us>.

Urogenital: Case 5 cont.

Prompt

Given this annotated image,
can you see any signs of mass or stones?



GPT-4V

The area circled in red may be drawing attention to a specific structure or finding. It looks like it's located in the region of the common bile duct or possibly another ductal structure. This could be indicative of a stone, mass, or other anomaly, but it's hard to say definitively from just this single slice and without further clinical context.

The annotations, which mention "Moyenne," "SD," "Max," "Min," and "Surface," seem to give measurements regarding the intensity and surface area of this region. The measurements could be related to Hounsfield Units or other radiodensity metrics commonly used in CT imaging.

Prompt

Given the patient's symptoms: Left renal colic. Rule out urolithiasis, please regenerate the answer.

GPT-4V

The image appears to be an axial CT scan of the abdominal region. The area circled in red seems to be near the region of the urinary system, possibly the ureter or renal pelvis. If this region represents increased radiodensity, it could be indicative of a stone, consistent with the symptoms of renal colic.

However, it's crucial to note that determining the presence of urolithiasis usually requires viewing multiple consecutive slices of the CT scan to trace the entire path of the ureter and evaluate the kidneys and bladder. A single slice might not provide the full picture.

Reference answer

Left renal mass of fatty attenuation (mean density = -96 HU). No renal, ureteric or bladder stone.

Figure 122 | Urogenital: Case 5 cont. This case shows a CT(Annotated or not) modality VQA example of adrenal myelolipoma. Adopt a step-by-step prompting strategy. However, GPT-4V's responses get worse when the patient is given additional information. <https://radiopaedia.org//cases/adrenal-myelolipoma-57?lang=us>.

Urogenital: Case 6

Prompt

The patient's symptoms: Left flank pain.

Please generate a structural report according to the image



GPT-4V

Findings:

Vertebral Column:

The lumbar vertebrae appear intact with maintained intervertebral disc spaces.

No obvious compression fractures or malalignments are noted.

Abdominal Soft Tissues:

There's no evidence of abnormal calcifications or free air under the diaphragm.

Pelvic Bones:

The pelvic bones, including the iliac wings, pubic rami, and ischial tuberosities, appear intact.

Both hip joints are well-seated with no evidence of dislocation.

Kidneys and Ureters:

There are no visible renal or ureteric calculi in this projection.

Other Observations:

Bowel gas patterns appear non-obstructive.

No obvious abnormal soft tissue masses or organomegaly can be appreciated.

Impression:

No acute radiological abnormality detected in the presented projection. However, absence of renal or ureteric calculi on plain radiographs does not rule out their presence. Further imaging, such as an ultrasound or a CT scan, might be beneficial if clinical suspicion remains high.

Reference answer

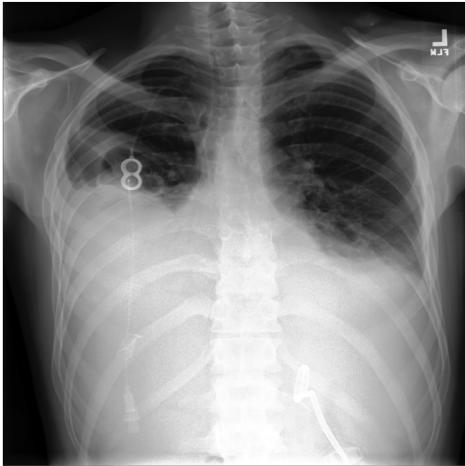
Left paraspinal calcification adjacent to the L3 inferior endplate in keeping with a ureteric calculus.

Dilated left ureter and pelvicalyceal system with retained iodinated contrast.

Small left lower renal calculus.

Figure 123 | Urogenital: Case 6. This case shows a X-ray modality report generation example of ureteric calculus and hydronephrosis. Although the patient's symptoms are given, GPT-4V shows a tendency of hallucination that each part is normal. <https://radiopaedia.org//cases/ureteric-calculus-and-hydronephrosis-x-ray?lang=us>.

Chest X-Ray: Localization of Pneumothorax



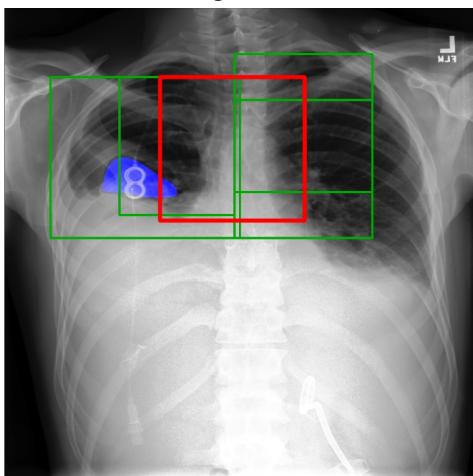
Prompt

This is a chest X-ray image, does it show pneumothorax?

GPT-4V

There appears to be a darker area on the right side (left on the image), which might suggest the absence of lung markings, a possible indicator of pneumothorax.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

Yes, the image does show pneumothorax.
Please localize the Pneumothorax in the image using bounding box.
The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (1024, 1024)$.

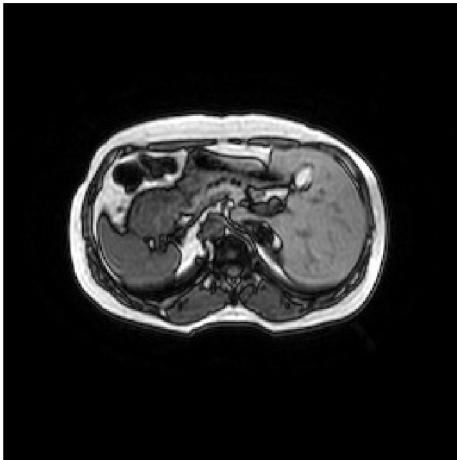
GPT-4V

Here's the bounding box coordinates for the region that may represent pneumothorax:

Top-left corner: $(x, y) = (100, 150)$
Bottom-right corner: $(x, y) = (512, 500)$

Figure 124 | Localize Pneumothorax in Chest X-Ray image. The highest IOU score of 4 predictions is 0.14; IOU score of the averaged bounding box is 0.03. This case is selected from [25].

Abdomen MRI: Localization of Spleen



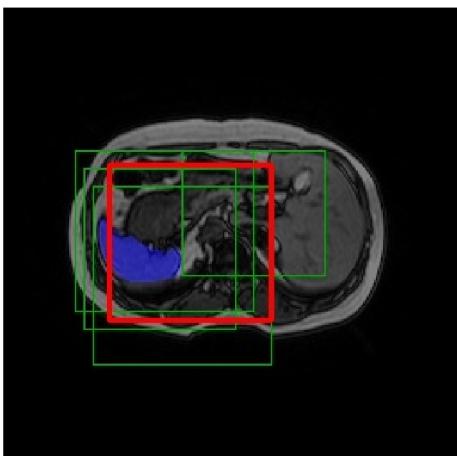
Prompt

This is an abdomen MRI image, does it include the spleen?

GPT-4V

Yes, the image appears to be an axial section of an abdominal MRI. The spleen is typically located on the left side of the abdomen, just below the rib cage. From this view, **it would be on the right side of the image** (since medical images are usually viewed as if you're looking at the person from their feet). Look for a crescent or triangular-shaped organ on the right side of the image.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

Yes, the image does include the spleen.
Please localize it in the image using bounding box.
The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (256, 256)$.

GPT-4V

Alright, based on the image you provided, I'll try to localize the spleen using bounding box coordinates.

Here are the approximate bounding box coordinates for the spleen:
Top-left corner: $(x, y) = (50, 100)$
Bottom-right corner: $(x, y) = (150, 200)$

Figure 125 | Localize Spleen in Abdomen MRI image. The highest IOU score of 4 predictions is 0.44; IOU score of the averaged bounding box is 0.39. This case is selected from [6].

Abdomen CT: Localization of Liver



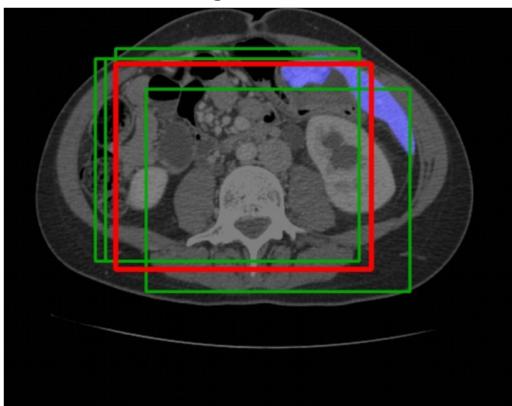
Prompt

This is an abdomen CT image, does it include the liver?

GPT-4V

Yes, the image you provided is an axial (cross-sectional) view of an abdominal CT scan. **The liver is visible in the image.** It is the large, solid organ located on the right side of the abdomen (which may appear on the left side of the image due to orientation). The liver is typically darker than the surrounding structures on a non-contrast CT scan.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

Yes, the image does include the liver.
Please localize the liver in the image using bounding box.
The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (510, 399)$.

GPT-4V

Alright, based on the provided CT scan image, I will attempt to localize the liver.

Bounding box for the liver:

Top-left corner (x, y) : approximately $(100, 50)$

Bottom-right corner (x, y) : approximately $(350, 250)$

Figure 126 | Localize Liver in Abdomen CT image. The highest IOU score of 4 predictions is 0.15; IOU score of the averaged bounding box is 0.143. This case is selected from [1].

Abdomen CT: Localization of Liver Tumor

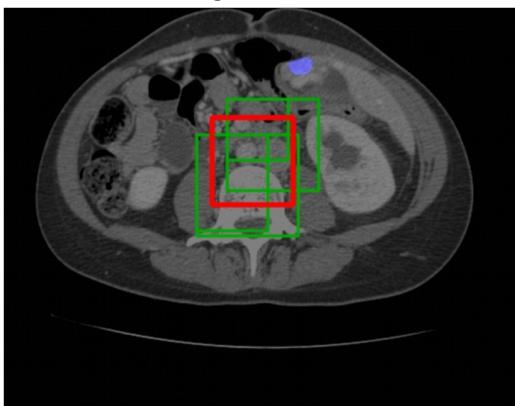


Prompt

This is an abdomen CT image. There is a tumor on the liver. Please localize the liver tumor in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (510, 399)$.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



GPT-4V

Based on the provided CT image of the abdomen, I've identified the location of the liver tumor and here are the bounding box coordinates for the tumor:

Top-left corner: $(x, y) = (190, 125)$

Bottom-right corner: $(x, y) = (290, 225)$

Figure 127 | Localize Liver Tumor in Abdomen CT image. The highest IOU score of 4 predictions is 0.0; IOU score of the averaged bounding box is 0.0. This case is selected from [1].

Abdomen CT: Localization of Kidney (Case 1)



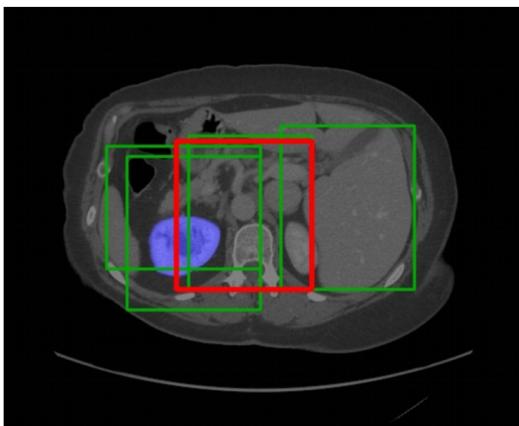
Prompt

This is an abdomen CT image, how many kidneys does it include?

GPT-4V

Based on the provided CT image of the abdomen, it appears there are two kidneys present, which is typical for most humans.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

Yes, there are two kidneys in the image. Please localized the left kidney (left of the patient) in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (507, 446)$.

GPT-4V

Here's a bounding box that approximately outlines the left kidney (from the patient's perspective):

Top-left corner $(x, y) = (180, 150)$

Bottom-right corner $(x, y) = (300, 300)$

Figure 128 | Localize the Left Kidney in Abdomen CT image. The highest IOU score of 4 predictions is 0.20; IOU score of the averaged bounding box is 0.12. This case is selected from [11].

Abdomen CT: Localization of Kidney (Case 2)



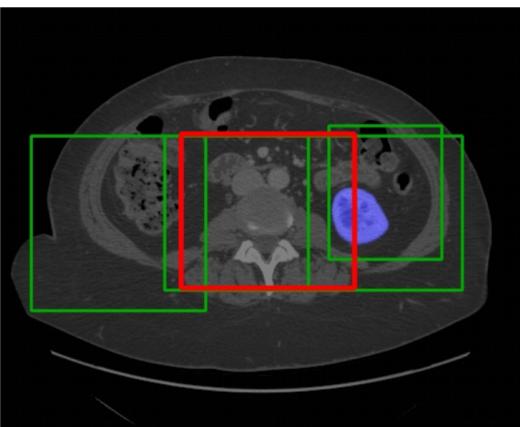
Prompt

This is an abdomen CT image, how many kidneys does it include?

GPT-4V

The image appears to be an axial (cross-sectional) view of an abdominal CT scan. Based on the image provided, I can see two kidney-shaped structures, suggesting that there are two kidneys present in this slice of the image.

Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

No, there is only one kidney in the image. Please tell it is the right kidney of the patient or the left one. Then localized it in the image using bounding box.
The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (507, 446)$.

GPT-4V

The kidney visible in the image is on the patient's left side, which is on the right side of the image as we view it. I'll provide coordinates for a bounding box around it:

Bounding box coordinates:

Top-left corner (x_1, y_1): Approximately $(300, 150)$

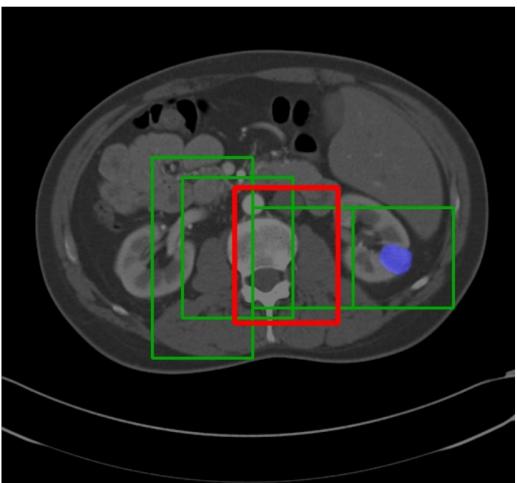
Bottom-right corner (x_2, y_2): Approximately $(450, 300)$

Figure 129 | Localize the Left Kidney in Abdomen CT image. The highest IOU score of 4 predictions is 0.21; IOU score of the averaged bounding box is 0.05. This case is selected from [11]. Note that to evaluate the robustness of GPT-4V, we flipped the image vertically so that the left kidney of the patient appears on the right side of the image.

Abdomen CT: Localization of KidneyTumor



Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

This is an abdomen CT image. There is a tumor on one of the kidney. Please tell which kidney shows the tumor and localized the tumor in the image using bounding box. The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (512, 477)$.

GPT-4V

Based on the CT image provided, the tumor appears to be on the right kidney (which is on the left side of the image when we view it).

Here's the bounding box for the tumor:

Top-left corner: $(x, y) = (150, 150)$
Bottom-right corner: $(x, y) = (250, 250)$

Figure 130 | Localize the Kidney Tumor in Abdomen CT image. The highest IOU score of 4 predictions is 0.10; IOU score of the averaged bounding box is 0.0. This case is selected from [5].

Spine MRI: Localization of Sacrum



Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

This is an MRI image, does it show the sacrum?

GPT-4V

The image appears to be an MRI of the spine. However, based on the section visible, it primarily displays the lumbar vertebrae and the lower thoracic region. The sacrum is located below the lumbar spine, and it's not clearly visible in this image.

Prompt

It does show the sacrum. Please localize it in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (880, 880)$.

GPT-4V

Got it. I'll provide a bounding box to localize the sacrum on the image.

Based on the MRI image you provided:

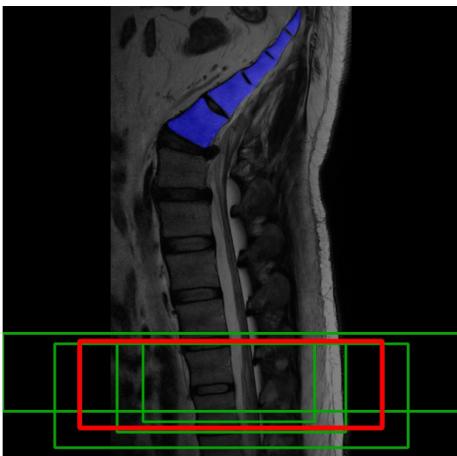
Top-left corner of the bounding box: $(x_1, y_1) = (0, 680)$
Bottom-right corner of the bounding box: $(x_2, y_2) = (880, 880)$

Figure 131 | Localize the Sacrum in Spine MRI image. The highest IOU score of 4 predictions is 0.47; IOU score of the averaged bounding box is 0.36. This case is selected from [18].

Spine MRI: Localization of Sacrum (Flipped View)



Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

This is an MRI image, does it show the sacrum?

GPT-4V

The image you've shared appears to be a sagittal section of an MRI scan, focusing on the spinal region. Based on this view, the sacrum would be located at the lower end of the vertebral column, below the lumbar vertebrae. However, without a complete view or more specific markers, it can be challenging to definitively identify the sacrum or its exact location in the image.

Prompt

It does show the sacrum. Please localized it in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (880, 880)$.

GPT-4V

Based on the image, the sacrum appears to be the triangular bone structure located at the bottom of the vertebral column, just above the tailbone (coccyx).

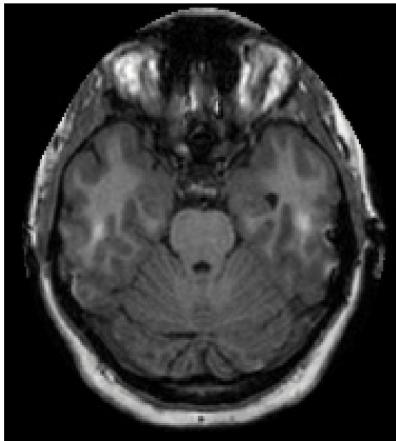
Bounding box coordinates for the sacrum:

Top-left corner: $(x, y) \approx (270, 650)$

Bottom-right corner: $(x, y) \approx (600, 800)$

Figure 132 | Localize the Sacrum in Spine MRI image. The highest IOU score of 4 predictions is 0.0; IOU score of the averaged bounding box is 0.0. This case is selected from [18]. Note that to evaluate the robustness of GPT-4V, we flipped the image in figure 131 horizontally so that the sacrum appears on the top of the image.

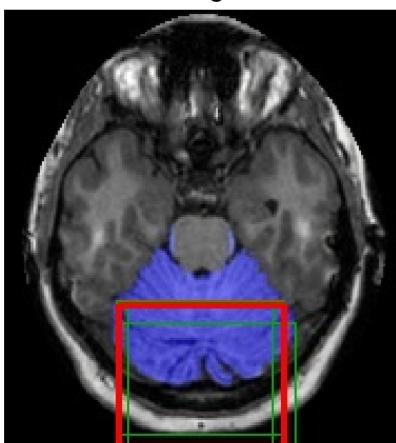
Brain MRI: Localization of Cerebellum



Green: Detected Bboxes

Red: Averaged Bbox

Blue: Correct Segmentation



Prompt

This is a brain MRI image, does it include the cerebellum?

GPT-4V

Yes, the image you provided is an axial view of a brain MRI.

The cerebellum is visible in the image, located at the lower posterior part of the brain, just below the main bulk of the cerebral hemispheres.

Prompt

Yes, it does include the Cerebellum. Please localize it in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (176, 198)$.

GPT-4V

Here's a bounding box that localizes the cerebellum in the MRI image:

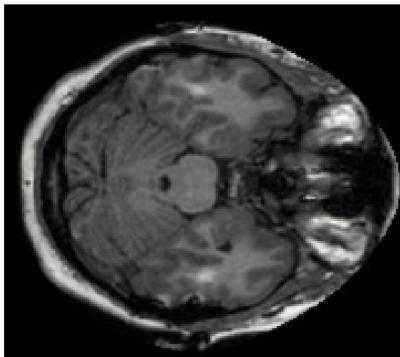
Top-left corner: $(x, y) = (55, 130)$

Bottom-right corner: $(x, y) = (120, 198)$

This area roughly encompasses the cerebellum based on the provided MRI image.

Figure 133 | Localize the Cerebellum in Brain MRI image. The highest IOU score of 4 predictions is 0.33; IOU score of the averaged bounding box is 0.35. This case is selected from [7].

Brain MRI: Localization of Cerebellum (Rotated View)



Prompt

This is a brain MRI image, does it include the cerebellum?

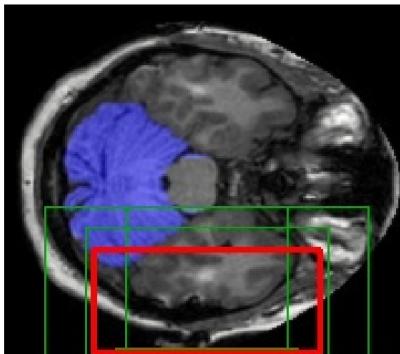
GPT-4V

Yes, the image provided appears to be a brain MRI. The cerebellum can be observed towards the bottom of the image, which is the slightly darker, lobulated structure below the main portion of the brain. Remember, a full assessment and interpretation of MRI images should be done by a qualified radiologist or medical professional.

Green: Detected Bboxes

Red: Averaged Bbox

Blue: Correct Segmentation



Prompt

Yes, it does include the Cerebellum. Please localize it in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (198, 176)$.

GPT-4V

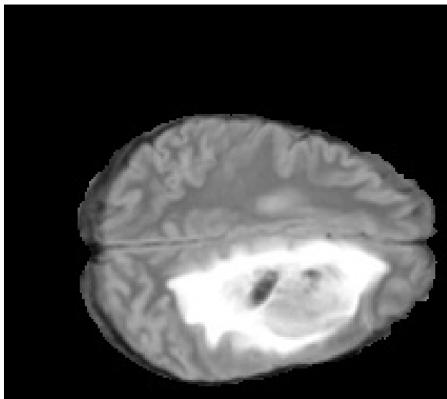
Sure! Based on the provided image, the approximate bounding box for the cerebellum would be:

Top-left corner: $(x, y) \approx (20, 110)$

Bottom-right corner: $(x, y) \approx (180, 175)$

Figure 134 | Localize the Cerebellum in Brain MRI image. The highest IOU score of 4 predictions is 0.14; IOU score of the averaged bounding box is 0.05. This case is selected from [7]. Note that to evaluate the robustness of GPT-4V, we rotate the image in figure 133.

Brain MRI : Localization of Brain Tumor



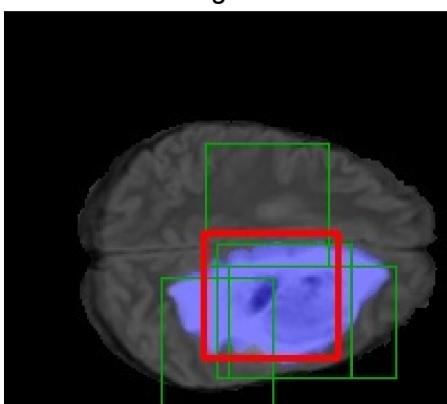
Prompt

This is a brain MRI image and it shows a tumor. Please localize the tumor in the image using bounding box. The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (200, 200)$.

Green: Detected Bboxes

Red: Averaged Bbox

Blue: Correct Segmentation



GPT-4V

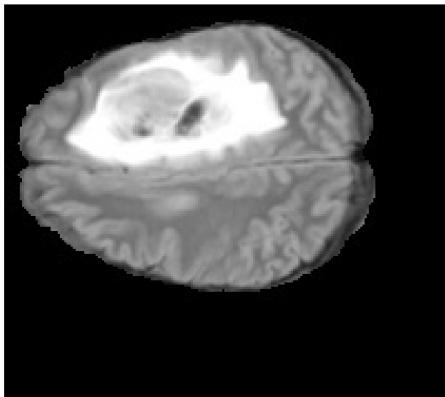
Here's a bounding box for the region where the tumor seems to be located:

Top-left corner: $(x, y) = (100, 125)$

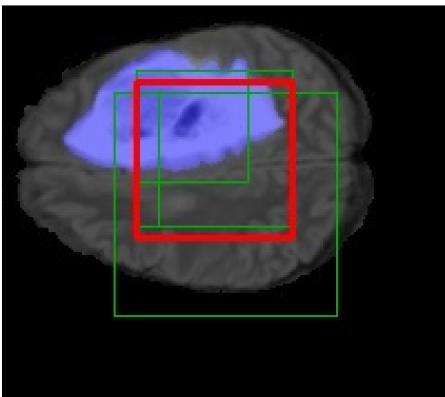
Bottom-right corner: $(x, y) = (175, 175)$

Figure 135 | Localize the Tumor in Brain MRI image. The highest IOU score of 4 predictions is 0.57; IOU score of the averaged bounding box is 0.57. This case is selected from [7].

Brain MRI: Localization of Brain Tumor (Rotated View)



Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

This is a brain MRI image and it shows a tumor. Please localize the tumor in the image using bounding box. The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (200, 200)$.

GPT-4V

Based on the image provided, the area that appears to represent a tumor can be found approximately at the following coordinates:

Bounding Box:

Top-left corner (x_1, y_1) : (50, 50)

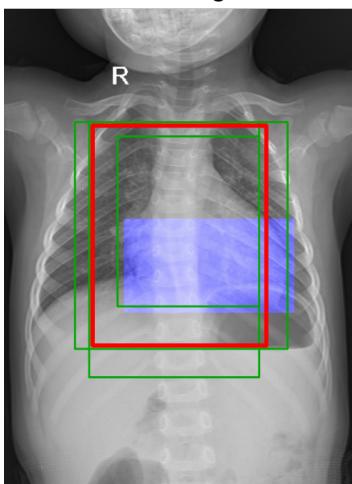
Bottom-right corner (x_2, y_2) : (150, 150)

Figure 136 | Localize the Tumor in Brain MRI image. The highest IOU score of 4 predictions is 0.42; IOU score of the averaged bounding box is 0.35. This case is selected from [7]. Note that to evaluate the robustness of GPT-4V, we rotate the image in figure 135.

Chest X-Ray: Localization of Cardiomegaly



Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

This is a chest x-ray image, does it show cardiomegaly?

GPT-4V

Based on the image you provided, it seems like there is some enlargement of the cardiac silhouette.

Cardiomegaly typically refers to an enlarged heart, and one of the signs on a chest X-ray can be an increased width of the cardiac silhouette.

Prompt

Yes, it does show cardiomegaly. Please localized it in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (1236, 1692)$.

GPT-4V

I understand. Given the dimensions of the image, I'll try to outline a bounding box around the heart silhouette.

Please note that this bounding box is an estimation and may not perfectly localize the heart or indicate the exact extent of cardiomegaly.

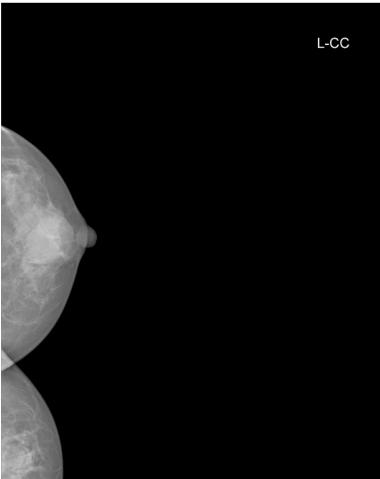
Here's an estimation based on the given image:

Top-left corner: $(x, y) = (400, 450)$

Bottom-right corner: $(x, y) = (900, 1050)$

Figure 137 | Localize the Cardiomegaly in Chest X-Ray image. The highest IOU score of 4 predictions is 0.42; IOU score of the averaged bounding box is 0.33. This case is selected from [14].

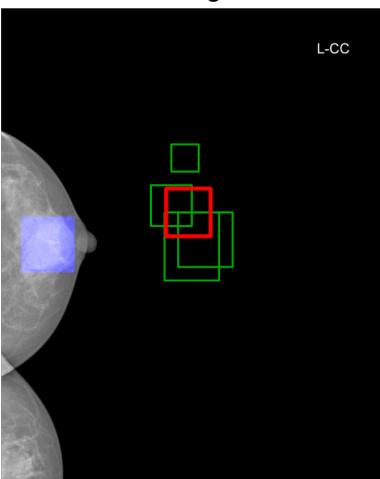
Breast X-Ray: Localization of Mass



Green: Detected Bboxes

Red: Averaged Bbox

Blue: Correct Segmentation



Prompt

This is a breast x-ray image, does it show any mass?

GPT-4V

The image appears to be a mammogram of the left breast, labeled as "L-CC" (Left Cranio-Caudal view). Mammograms are used to detect and diagnose breast diseases, such as masses and calcifications. From the provided image, it's challenging to definitively identify any masses or abnormalities without the context of a patient's medical history, physical examination, and other relevant clinical data. Also, the interpretation of mammograms requires specialized training and expertise.

Prompt

Yes, it does show cardiomegaly. Please localize it in the image using bounding box.

The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (2800, 3518)$.

GPT-4V

I will attempt to localize the mass in the image based on visual inspection. Please note that this should not replace a professional radiologist's interpretation.

Let's identify the area of concern.

Upon visual inspection, I observe a potential area of concern in the region:

Top-left corner: $(x, y) = (1300, 1500)$

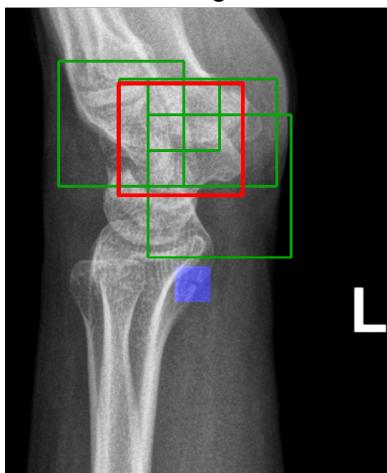
Bottom-right corner: $(x, y) = (1700, 1900)$

Figure 138 | Localize the Mass in Breast X-Ray image. The highest IOU score of 4 predictions is 0.0; IOU score of the averaged bounding box is 0.0. This case is selected from [15].

Palm X-Ray: Localization of Bone Fracture



Green: Detected Bboxes
Red: Averaged Bbox
Blue: Correct Segmentation



Prompt

This is a X-Ray image of palm and it shows a bone fracture. Please localize it in the image using bounding box. The top-left corner of this image is $(x, y) = (0, 0)$, while the bottom-right corner of this image is $(x, y) = (1081, 1318)$.

GPT-4V

I understand your request. Here's the localization of the fracture:

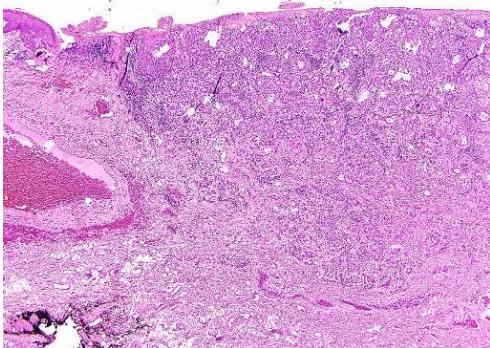
Bounding box:
Top-left corner: $(x, y) = (320, 200)$
Bottom-right corner: $(x, y) = (760, 500)$

Figure 139 | Localize the Fracture in Palm X-Ray image. The highest IOU score of 4 predictions is 0.0; IOU score of the averaged bounding box is 0.0. This case is selected from Radiopaedia.

Anus

Prompt

May you please write a report for this image?



GPT-4V

Histological Analysis Report

Slide Description: Hematoxylin and eosin-stained tissue section.

Observations:

- Tissue Architecture:** The tissue presents a layered structure, suggestive of an epithelial origin. The superficial layer seems thinner and demonstrates a stratified appearance, which may correspond to an epithelial lining.
- Cellular Characteristics:** The cells in the superficial layer display a more compact arrangement with darker staining nuclei. The deeper layers exhibit a more dispersed cellular arrangement with a mix of cell sizes and nuclear staining patterns.
- Stroma:** The underlying stroma appears relatively dense and is populated with cells that may represent fibroblasts,

immune cells, or other stromal elements. There are also some clear spaces, which might indicate the presence of small blood vessels or artifact areas.

4. Inclusions/Abnormalities: There are sporadic white spaces seen within the tissue. These might be due to artifacts from the tissue processing or might represent actual tissue features like small cystic spaces or vascular structures.

Prompt

This is an image of anus tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Based on the provided image and the previously mentioned observations, and considering the specified location as the anus, some potential diagnoses to consider include:

- Normal Anal Tissue:** It could be a representative section of normal anal tissue, which consists of stratified squamous epithelium transitioning to a columnar epithelium deeper within the anal canal.
- Chronic Inflammation:** If there are increased immune cells within the stroma, it might indicate some form of chronic inflammation or irritation.
- Anal Intraepithelial Neoplasia (AIN):** In cases where there are cellular atypias or irregularities in the epithelial layer, AIN could be a consideration. It is a precursor lesion to anal cancer.
- Other Lesions:** Various benign or malignant conditions could potentially manifest in this region. For example, condylomas (warts) due to HPV infection, benign anal polyps, or even squamous cell carcinomas.

Reference answer

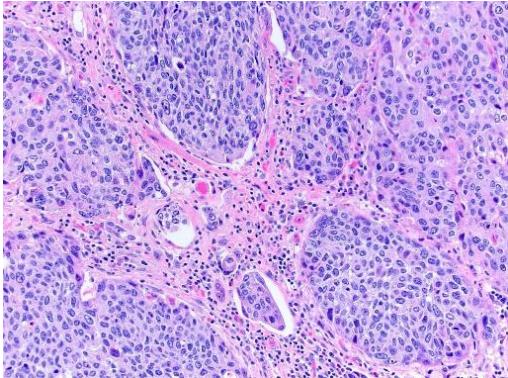
Anal adenocarcinoma: Infiltrating, gland forming anal adenocarcinoma, with intact squamous epithelium visible in the upper left.

Figure 140 | Anus. This histopathological image shows a patch of whole slide image (WSI) for anal adenocarcinoma from anus tissue. GPT-4V writes a detailed report and further identifies epithelium structures. While for the final diagnosis, it provides several potential diagnoses with no correct option. The original image can be found in <https://www.pathologyoutlines.com/topic/anusadenocarcinoma.html>.

Bladder

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Report

Image Description: The image depicts a microscopic view of a tissue sample stained with hematoxylin and eosin (H&E), a common staining technique used in histology to visualize cellular structures.

Observations:

1. The tissue consists of multiple cells, primarily appearing as small, purple-stained nuclei surrounded by a pinkish cytoplasm.
2. There are elongated structures and branching patterns visible throughout the sample, indicative of connective tissue or stromal components.
3. Few larger, oval-shaped clear spaces are observed, which may represent vascular structures or ducts.
4. The overall cellular arrangement suggests a densely packed tissue with cells in close proximity to one another.

Potential Tissue Type: Given the features observed, this could be a section of a glandular or epithelial tissue. The presence of potential vascular structures or ducts, combined with the dense cellular arrangement, could suggest a tissue from an organ with secretory functions. However, a more specific identification would require additional clinical and pathological context.

Conclusion: The image provides a detailed view of a tissue sample with characteristic cellular structures and patterns. Further analysis and clinical information would be necessary for a definitive diagnosis or more precise tissue identification.

Prompt

This is an image of bladder tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Based on the provided image and the previous report description, the tissue appears to be a section of densely packed cells, potentially from a glandular or epithelial tissue. If this is indeed bladder tissue, a densely packed cellular arrangement might raise suspicion for a neoplastic process, such as urothelial carcinoma (a common type of bladder cancer). Urothelial carcinoma often presents as a proliferation of urothelial cells, which can form papillary structures or appear more infiltrative in nature.

However, it's essential to understand that a definitive diagnosis requires a thorough examination of the tissue, often in multiple sections and magnifications, and potentially with additional special stains. Clinical context, such as patient symptoms, history, and other investigations, would also play a vital role in forming a diagnosis.

Reference answer

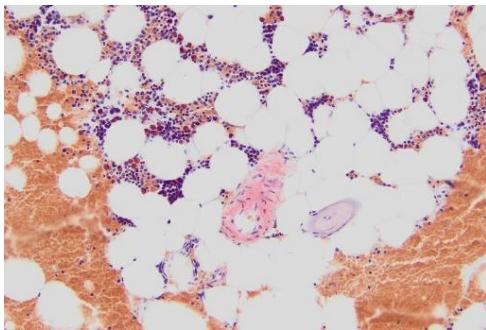
Invasive urothelial carcinoma with lymphovascular invasion.

Figure 141 | Bladder. This histopathological image shows a patch of WSI for invasive urothelial carcinoma from bladder tissue. GPT-4V identifies epithelium structure and provides the correct diagnostic result when given the prompt of bladder tissue. The original image can be found in <https://www.pathologyoutlines.com/topic/bladderurothelialinvasivegen.html>.

Bone

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Report

Image Description:

The image displays a microscopic view of tissue sections, stained to reveal cellular and structural details.

Observations:

- 1. Adipose Tissue:** There are multiple clear, round structures which represent adipose tissue or fat cells. These cells are identifiable by their large, clear, vacuolated appearance. The nuclei of these cells are pushed to the periphery due to the large fat droplet they contain.
- 2. Other Cells:** Interspersed between the fat cells, there appear to be smaller cells with dense nuclei, possibly representing fibroblasts or other stromal cells.

3. Staining: The tissue appears to be stained with a standard Hematoxylin and Eosin (H&E) stain, judging from the blue-stained nuclei and the pinkish hue of the cytoplasm and extracellular matrix.

4. Additional Structures: In the lower-left corner, there is a portion of tissue that is more densely cellular and might represent another type of tissue, perhaps muscle or connective tissue, though further examination would be needed for a definitive conclusion.

Preliminary Interpretation:

The predominant feature in this image is adipose tissue, surrounded by some stromal elements. The exact type and purpose of the tissue section can be better discerned with additional clinical or experimental context.

Prompt

This is an image of bone marrow. What is most likely diagnostic result based on the image and report?

GPT-4V

Based on the image and the report, the prominent feature observed is adipose tissue within the bone marrow. Bone marrow contains both hematopoietic (blood-forming) tissue and stromal (supportive) tissue which includes fat cells.

In a typical adult bone marrow sample, the presence of adipose tissue is normal. However, the ratio of hematopoietic tissue to adipose tissue can vary depending on the age of the individual and the location from which the bone marrow sample was taken.

The increased prominence of adipose tissue at the expense of hematopoietic tissue can be suggestive of a few scenarios:

- 1. Age and Site-related Changes:** It's normal for certain bones, especially those of the extremities in older adults, to have more fatty marrow.
- 2. Bone Marrow Hypoplasia:** An abnormally low amount of hematopoietic tissue relative to fat might indicate marrow hypoplasia, a condition where the bone marrow doesn't produce enough blood cells.
- 3. Recovery Phase:** After a condition or treatment that suppresses bone marrow function (like chemotherapy), the marrow might show an increased amount of fat as it begins to recover.
- 4. Other Conditions:** Certain conditions like aplastic anemia, some types of leukemia, or after administration of certain medications can also lead to changes in the bone marrow's composition.

Reference answer

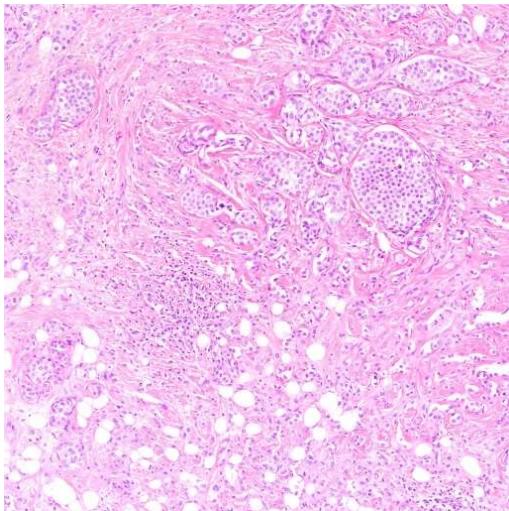
Plasma cell myeloma (multiple myeloma). Amyloid deposition associated a vessel in the bone marrow clot section of a patient with plasma cell myeloma stained with Congo red

Figure 142 | Bone. This histopathological image shows a patch of WSI for plasma cell myeloma (multiple myeloma) from bone marrow. Even with the given prompt of tissue origin, GPT-4V still fails to provide the correct option of disease. The original image can be found in <https://www.pathologyoutlines.com/topic/lymphomamyeloma.html>.

Breast

Prompt

May you please write a report for this image?



GPT-4V

The image appears to be a microscopic view of a tissue sample, consistent with histological sections often used in pathology or medical research. The pinkish-purple hue is indicative of a common staining technique used in histology called Hematoxylin and Eosin (H&E) staining.

In H&E staining:

Hematoxylin stains cell nuclei blue.

Eosin stains the cytoplasm and extracellular matrix pink. From the image, there seems to be a variation in cell density, with certain areas having tightly packed cells and others with more scattered cells. Some areas demonstrate more prominent nuclei, suggesting a higher cell concentration or potential cellular activity.

Prompt

This is an image of breast tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

I'm not a pathologist, but based on the provided image and the description, it's a microscopic view of a breast tissue sample stained with Hematoxylin and Eosin (H&E).

While I can identify certain characteristics from the image, such as cell density and the appearance of nuclei, a definitive diagnosis requires a detailed evaluation by a pathologist who would take into consideration many factors including cellular architecture, the presence or absence of specific cell types, and other morphological features.

Breast tissue can have various pathologies ranging from benign conditions like fibrocystic changes, fibroadenomas, and benign breast tumors to malignant conditions like ductal carcinoma in situ (DCIS) and invasive breast carcinomas.

To obtain an accurate diagnosis, please consult with a medical professional or pathologist who can provide a comprehensive assessment of the tissue sample.

Reference answer

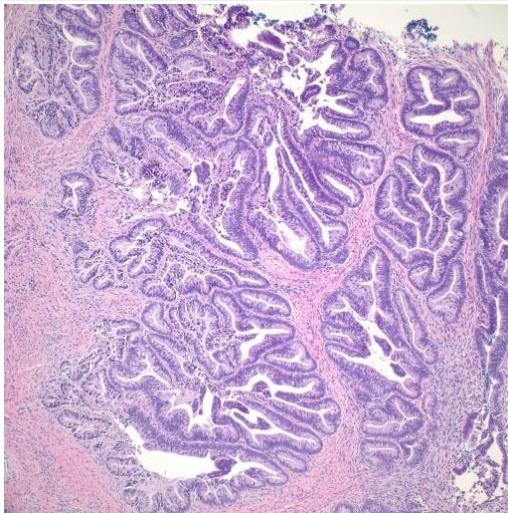
Invasive ductal carcinoma with adjacent focus of tumor within a lymphatic space

Figure 143 | Breast. This histopathological image shows a patch of WSI for invasive ductal carcinoma from breast tissue. Although one of diagnostic results provided by GPT-4V is the correct answer, it seems that GPT-4V just list several alternatives according to the prompt of breast tissue without analyzing the image. The original image can be found in <https://www.pathologyoutlines.com/topic/breastmalignantlobularclassic.html>.

Cervix

Prompt

May you please write a report for this image?



GPT-4V

Of course! The image appears to be a histological section stained with hematoxylin and eosin (H&E stain), which is commonly used to visualize tissue structures under a microscope.

Histological Report:

Sample: Unknown tissue

Staining Method: Presumed Hematoxylin and Eosin (H&E)

Observation:

1. **Glandular Structures:** The section predominantly displays glandular structures. These glands are closely packed and appear to have a branched architecture. The luminal spaces within the glands vary in size, with some appearing more dilated than others.

2. **Epithelial Lining:** The glands are lined by a layer of epithelial cells. The nuclei of these cells are basally located, and the cytoplasm appears eosinophilic (pink staining). There's no immediate evidence of significant cellular atypia or abnormal mitotic figures.

3. **Stroma:** Surrounding the glandular structures is a connective tissue stroma. The stroma appears relatively uniform and does not show significant infiltration by inflammatory cells.

Preliminary Interpretation:

The tissue appears to be of glandular origin, potentially from an organ with a significant glandular component such as the digestive system (e.g., stomach, intestine) or reproductive system (e.g., endometrium). The absence of overt cellular atypia or other malignant features is a positive sign, but a definitive diagnosis would require clinical correlation and potentially additional stains or tests.

Prompt

This is an image of cervix tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given that the tissue is from the cervix and based on the image and the histological report provided:

The image depicts glandular structures that are closely packed with varying luminal sizes, lined by epithelial cells with basally located nuclei. The surrounding stroma appears relatively uniform.

This appearance is consistent with endocervical glands, which are a normal component of the cervical tissue.

The lack of overt cellular atypia, significant inflammation, or other malignant features suggests a benign nature.

Most Likely Diagnostic Result: **Benign endocervical tissue.**

Reference answer

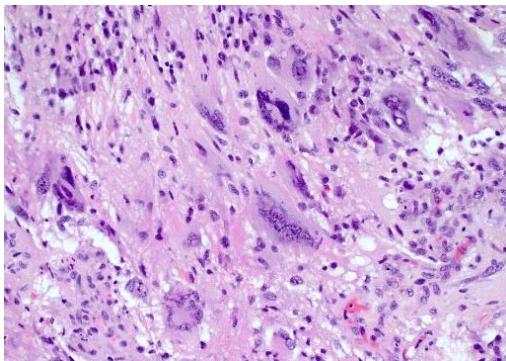
Cervix adenocarcinoma in situ (AIS), glands with cellular crowding/ stratification, enlarged hyper chromatic nuclei

Figure 144 | Cervix. This histopathological image shows a patch of WSI for cervix adenocarcinoma in situ (AIS) from cervix tissue. GPT-4V successfully identifies the tissue origin of this image without any prior knowledge. While it fails to find abnormalities and detect the cancer at last. The original image can be found in <https://www.pathologyoutlines.com/topic/cervixAIS.html>.

Central nervous system

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Analysis Report

Image Description:

The image displays a microscopic view of a tissue sample, with characteristic features consistent with a histological slide. The sample appears to be stained, likely with hematoxylin and eosin (H&E), a common staining technique used in histopathology.

Observations:

1. The tissue displays a dense cellular arrangement with prominent nuclei. The nuclei appear to be hyperchromatic (deeply stained), indicating a high DNA content.
2. Some areas show cells with an increased nucleus-to-cytoplasm ratio.
3. There are regions of eosinophilic (pinkish) extracellular matrix amidst the cells, suggesting possible stromal or connective tissue elements.

4. No clear evidence of glandular structures or other specific tissue patterns can be identified from this image.

Preliminary Conclusion:

The slide appears to represent a tissue section, possibly from a solid organ or a lesion. The features suggest a high cellular activity, and the dense cellular arrangement could be indicative of a neoplastic process. However, a definitive diagnosis cannot be made based solely on this image. Further clinical correlation, additional staining, and expert histopathological evaluation are recommended for a conclusive diagnosis.

Prompt

This is an image of brain tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given that the image is of brain tissue, the presence of dense cellular arrangement with prominent hyperchromatic nuclei and an increased nucleus-to-cytoplasm ratio suggests high cellular activity. These features are often associated with gliomas, a type of tumor that originates from the supportive cells (glial cells) of the brain.

Considering the report and the fact that the image is of brain tissue, a likely diagnostic consideration is:

Glioma: This is a broad category of brain and spinal cord tumors that come from glial cells. The specific subtype (e.g., astrocytoma, oligodendrogioma, glioblastoma) would require more detailed histological evaluation, special staining, and possibly molecular testing.

Reference answer

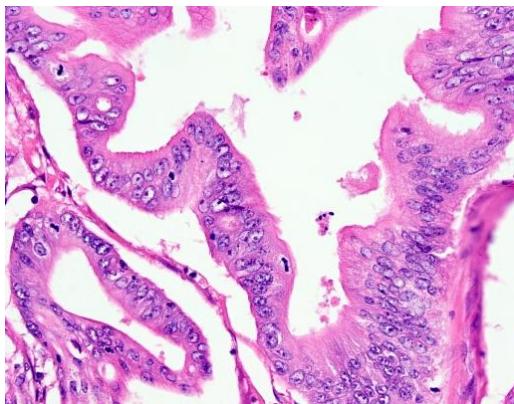
Glioblastoma with giant cell features showing neoplastic cells with marked nuclear pleomorphism.

Figure 145 | Central neural systems. This histopathological image shows a patch of WSI for glioblastoma from brain tissue. GPT-4V finds the abnormalities and correctly diagnose the glioma from the given histopathology image and the prompt of brain tissue, while it cannot determine the subtype of the tumor. The original image can be found in <https://www.pathologyoutlines.com/topic/CNSTumorgliomasglioblastomasIDHwildtype.html>.

Colon

Prompt

May you please write a report for this image?



GPT-4V

Certainly! The image appears to be a histological slide showing a section of tissue stained with hematoxylin and eosin (H&E). This is a common staining method used in pathology to visualize the cellular structures and organization of tissues.

Here's a general description based on the image:

Histological Report:

Tissue Type: Not definitively identified from the image alone, but it appears to resemble epithelial tissue.

Staining: Hematoxylin and eosin (H&E)

Observations:

1. The tissue section demonstrates layers of epithelial cells with nuclei stained dark purple by the hematoxylin. The cytoplasm of the cells is stained pink by the eosin.
2. The epithelial cells appear to be organized in tubular or glandular formations.

3. There are no overt signs of cellular atypia, necrosis, or mitotic figures based on the provided image, though a higher magnification and broader field of view would be required for a more comprehensive assessment.

4. The underlying stroma, which supports the epithelial structures, is lightly stained and appears to have some scattered cells.

Conclusion:

The image shows a section of tissue with features consistent with epithelial origin, possibly from a glandular structure. No overt pathological features are observed in the provided image. However, it's essential to understand the clinical context and have a more extensive examination of the sample for a definitive diagnosis.

Prompt

This is an image of colon tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given that the tissue is from the colon and based on the observations from the provided image:

The image seems to depict glandular structures characteristic of colonic mucosa. The absence of overt cellular atypia, necrosis, or prominent mitotic figures suggests that the tissue might be benign.

Likely Diagnostic Result: **Normal or benign colonic mucosa.**

Reference answer

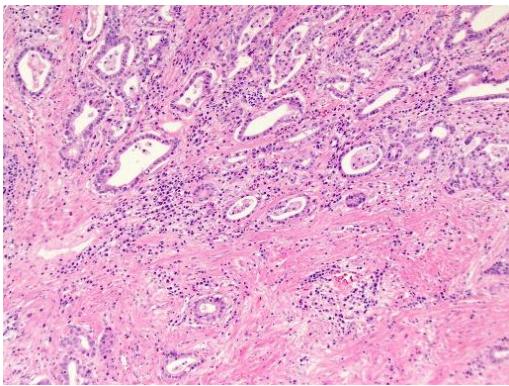
Colon serrated adenocarcinoma. Vesicular nuclei with prominent nucleoli and abundant eosinophilic cytoplasm (molecular profile of this particular case: microsatellite stable, BRAF V600E, SMAD4 and TP53 mutations)

Figure 146 | Colon. This histopathological image shows a patch of WSI for serrated adenocarcinoma from colon tissue. GPT-4V fails to detect abnormalities from the image. This image can be found in <https://www.pathologyoutlines.com/topic/colontumorserratedadeno.html>.

Esophagus

Prompt

May you please write a report for this image?



GPT-4V

The image appears to be a photomicrograph of a tissue section, most likely stained with hematoxylin and eosin (H&E).

Based on the morphology observed:

Tissue Photomicrograph Report

Staining Technique: Hematoxylin and eosin (H&E)

Observed Features:

1. **Tubular structures:** These structures, likely glandular in nature, can be seen interspersed throughout the section.

Their luminal spaces and cellular arrangements are indicative of glandular tissue.

2. **Stroma:** Surrounding the glandular structures, there appears to be a supportive connective tissue, possibly indicative of stroma.

3. **Cellular density:** The cells appear densely packed in some regions, suggesting a higher cellular activity or possibly a specific type of tissue.

Potential Tissue Type: Given the presence of glandular structures and surrounding stroma, this tissue might be from an organ with glandular function. Possibilities include parts of the digestive system, reproductive system, or other glandular organs.

Prompt

This is an image of esophagus tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given the provided context that this is esophageal tissue, and based on the observed features in the image: The tissue displays tubular structures suggestive of glandular formations. In the context of the esophagus, these could represent esophageal glands. The dense cellular arrangement and supportive stromal tissue surrounding these structures are consistent with normal esophageal histology.

Potential Diagnosis:

Normal Esophageal Tissue: The presence of the glandular structures and the stroma suggest this might be a section of the lower esophagus where submucosal glands are more commonly found.

Reference answer

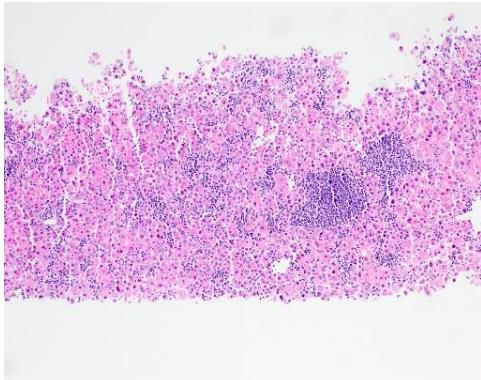
Adenocarcinoma of the esophagus and GE junction: Tubular pattern is the most common morphologic pattern seen in esophageal adenocarcinoma and shows individual or anastomosing tubules lined by a single layer or stratified malignant cells.

Figure 147 | Esophagus. This histopathological image shows a patch of WSI for adenocarcinoma of the esophagus and GE junction from esophagus tissue. GPT-4V correctly identifies the tubular structures from the pathology image and one of its provided potential tissue types is correct. However, it misdiagnose the adenocarcinoma of the esophagus as normal tissue after given the prompt of tissue origin. The original image can be found in <https://www.pathologyoutlines.com/topic/esophagusadenocarcinoma.html>.

Hepatobiliary

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Report

Image Description:

The image appears to be a microscopic view of a tissue section stained with hematoxylin and eosin (H&E). H&E staining is commonly used in histology to differentiate cellular and extracellular components.

Observations:

The tissue has a range of cell densities with some areas densely packed and others more sparse.

There are regions with cells that appear to be organized, suggesting a potential epithelial origin or a lining of some kind.

There are also clusters of cells with different staining intensities, indicating varying cell types or nuclei densities.

Some areas of the slide are devoid of cells and appear as white spaces, potentially representing lumen

or other non-cellular structures.

Preliminary Analysis:

Without specific context or clinical details, it's challenging to provide a definitive identification of the tissue type or any potential pathological findings. However, the variability in cell density and structure might be indicative of a glandular tissue or mucosal lining. Further investigation, ideally with clinical context and possibly additional staining techniques, would be beneficial for a more detailed and accurate assessment.

Prompt

This is an image hepatobiliary tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Possible Diagnoses:

1. **Cholangitis or Cholestasis:** The presence of possibly dilated or inflamed bile duct structures could indicate a cholangitis (inflammation of the bile ducts) or cholestasis (a condition where bile flow is reduced or stopped).
2. **Hepatitis:** If there is inflammation around the hepatocytes or the portal tracts, it might suggest some form of hepatitis, which is an inflammation of the liver.
3. **Hepatocyte Injury or Necrosis:** Areas of hepatocyte injury or dropout could suggest toxic, viral, or ischemic damage to the liver cells.
3. **Normal Variant:** Without more specific features, some of the observed changes could also be within normal limits or represent benign variations in the tissue.

Reference answer

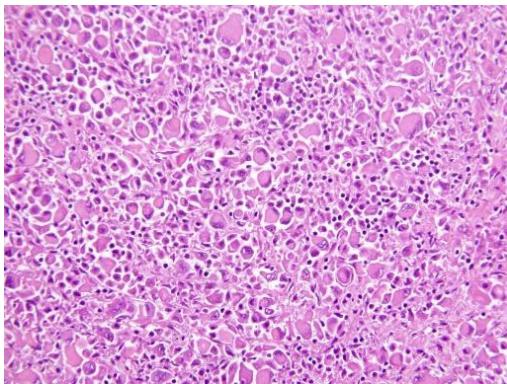
Hepatocellular carcinoma. Moderately differentiated HCC with dense lymphoid stroma.

Figure 148 | Hepatobiliary. This histopathological image shows a patch of WSI for Hepatocellular carcinoma from liver tissue. GPT-4V correctly analyzes the dense features from the image while none of its possible diagnoses hits the right answer. The original image can be found in <https://www.pathologyoutlines.com/topic/livertumorlehcc.html>.

Kidney

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Analysis Report

Image Description:

The image presents a high-magnification view of a tissue sample stained in a pinkish hue, typically indicative of a hematoxylin and eosin (H&E) stain, which is commonly used in histology.

Morphological Features:

- Cellular Composition:** The tissue appears to be dense and contains numerous cells. Most cells exhibit a round to oval shape, each with a distinct central nucleus.
- Cellular Arrangement:** The cells are closely packed, with minimal intercellular space. This compact arrangement suggests the tissue could be of epithelial or possibly lymphoid origin.
- Nuclei:** The nuclei are round to oval, with some showing variations in size and staining intensity. This might indicate

varying levels of cellular activity or differentiation.

4. **Stroma:** There is minimal visible stroma or connective tissue between the cells, emphasizing the cellular density of the tissue.

5. **Other Features:** There are no immediately distinguishable features such as glands, vessels, or other specialized structures in the provided image.

Preliminary Interpretation:

Based on the cellular composition and arrangement, the tissue could be a section of epithelial tissue or possibly lymphoid tissue, like a lymph node. However, a definitive identification would require more context, such as the source of the tissue, clinical history, and potentially additional staining methods.

Prompt

This is an image of kidney tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given that you've provided the context that this is kidney tissue, and based on the features observed in the image and the previous report, it appears that the tissue might be indicative of glomerulonephritis or another related condition.

In glomerulonephritis, the kidney's glomeruli – tiny blood vessels involved in the filtration of blood – become inflamed. The densely packed round to oval cells could represent inflammatory cells infiltrating the kidney tissue.

Reference answer

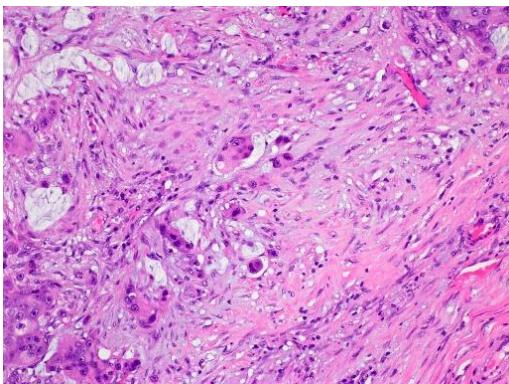
Clear cell renal cell carcinoma: Clear cell RCC with rhabdoid differentiation (grade 4 by definition): large, high grade cells with abundant homogeneous eosinophilic cytoplasm and eccentric nuclei.

Figure 149 | Kidney. This histopathological image shows a patch of WSI for clear cell renal cell carcinoma from kidney tissue. Although GPT-4V provides a detailed analysis of cellular, nuclei and stroma morphological features, it fails to identify the renal cell carcinoma. The original image can be found in <https://www.pathologyoutlines.com/topic/kidneytumormalignantrccclear.html>.

Lung

Prompt

May you please write a report for this image?



GPT-4V

The image appears to be a photomicrograph of a tissue sample stained with hematoxylin and eosin (H&E stain), which is a common stain used in histology to visualize cellular and tissue structures. Here's a general report based on the image:

Histological Report

Specimen: Unknown tissue (suggestive of a biopsy sample)

Staining: Hematoxylin and eosin (H&E) stain

Microscopic Description:

The slide displays a tissue with cells and extracellular matrix. There's a mix of cellular structures including what appear to be fibroblasts, as evidenced by elongated nuclei and surrounding extracellular matrix. The extracellular matrix has a pinkish hue, indicative of collagen fibers. Some areas show cells with larger nuclei and increased nuclear to cytoplasmic

ratio. Varying degrees of cellularity can be observed across the field of view. Several nucleated and non-nucleated cells are scattered throughout the tissue.

Comments:

The overall architecture of the tissue seems to be somewhat disrupted, suggesting a possible pathological process, though without further context or higher magnification views, it's challenging to provide a definitive diagnosis. It's crucial to correlate with clinical findings and consider additional stains or molecular tests if needed for a more accurate assessment.

Prompt

This is an image of lung tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given the context that this is lung tissue, and based on the earlier described histological features, the image may represent a form of interstitial lung disease, possibly pulmonary fibrosis. Interstitial lung diseases often manifest as thickened tissue due to scarring (fibrosis). The increased extracellular matrix and collagen fibers, as well as the disrupted architecture, are indicative of fibrotic changes.

Reference answer

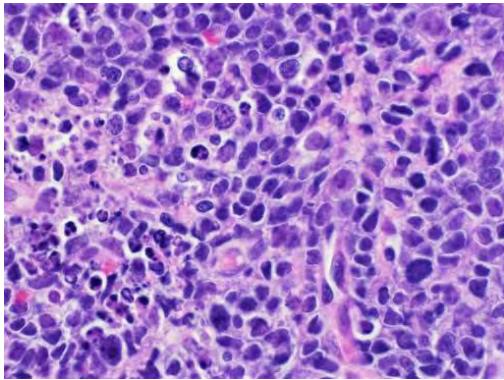
Lung squamous cell carcinoma: Tumor budding, small clusters and individual tumor cells in the stroma at the invasive front of the lesion.

Figure 150 | Lung. This histopathological image shows a patch of WSI for squamous cell carcinoma from lung tissue. GPT-4V seems to probe the abnormalities from the tissue structure while providing several potential lung diseases with no malignant tumors. This image can be found in <https://www.pathologyoutlines.com/topic/lungtumorSCC.html>.

Lymph node

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Report

Description:

The image presented is a magnified view of cells, likely from a tissue section, stained with a purple hue.

Observations:

1. The cells are densely packed with very little intervening stroma.
2. Cells predominantly exhibit a round to oval shape.
3. Most cells display a large nucleus that takes up a significant portion of the cell volume. The nuclei are of varying sizes and are predominantly stained dark purple.
4. There's evidence of multi-nucleated cells scattered throughout the field.
5. Some cells exhibit a clear or pale cytoplasmic region surrounding the nucleus, while others have a more densely stained cytoplasm.

6. There is some variation in cell size, suggesting a potential mix of cell maturation stages or cell types.

Possible Interpretations:

This could represent a variety of tissues under microscopic examination. The high density of cells, large nuclei, and the presence of multi-nucleated cells can be seen in certain hematologic tissues, certain types of tumors, or in reactive conditions. However, without additional context such as the type of stain used, tissue origin, or clinical history, a definitive interpretation cannot be provided.

Prompt

This is an image of lymph node tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

The image provided appears to be a high magnification of a lymph node tissue section. The presence of densely packed cells with large nuclei, occasional multi-nucleated cells, and variation in cell size can be suggestive of several conditions.

Given these observations, one possibility is that of a reactive lymph node, where the lymph node is responding to an infection or other stimulus. Reactive lymph nodes can have increased numbers of lymphocytes and can sometimes appear very cellular.

Another possibility, given the observations, is lymphoma. Lymphomas are cancers of the lymphatic system and can manifest in lymph nodes with a variety of appearances under the microscope. Certain types of lymphomas can present with densely packed cells and prominent nuclei.

Reference answer

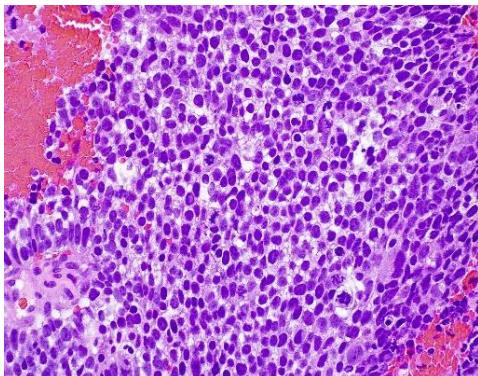
High grade B cell lymphoma, NOS shows overlapping morphologic features with Burkitt lymphoma, including round nuclei, high nuclear: cytoplasmic ratio and numerous apoptotic bodies. These lymphoid cells are slightly more pleomorphic than seen in Burkitt lymphoma.

Figure 151 | Lymph node. This histopathological image shows a patch of WSI for anaplastic large cell lymphoma from lymph node. GPT-4V correctly describes the morphological features of irregular nuclei while misidentifying the tissue origin. After given the prompt of lymph node, it provides three potential diseases based on the pathology image, which covers the true diagnosis. The original image can be found in <https://www.pathologyoutlines.com/topic/lymphomahighgradebcell.html>.

Nasal cavity

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Analysis Report

Image Description:

The image displays a microscopic view of a tissue sample that has been stained, presumably to highlight specific cell structures. The predominant coloration is purple, indicative of hematoxylin and eosin (H&E) staining, a common staining technique in histology.

Observations:

1. The tissue sample appears to be densely cellular with closely packed cells.
2. The cells exhibit a high nucleus-to-cytoplasm ratio, with darkly stained nuclei.
3. The tissue architecture seems disrupted, as no clear organized structures or patterns are evident.
4. A few areas show lighter staining, which might represent either extracellular matrix or areas of lower cell density.

Preliminary Interpretation:

The dense cellular nature and the high nucleus-to-cytoplasm ratio of the cells may suggest a proliferative condition, possibly a neoplastic process. The absence of a clear organized pattern further indicates the possibility of a malignant lesion. However, a definitive diagnosis would require a detailed clinical history, a comprehensive examination of the entire tissue sample, and possibly additional investigations.

Prompt

This is an image of nasal cavity tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given that the image is of nasal cavity tissue and considering the observations from the report:

1. Densely cellular tissue.
2. High nucleus-to-cytoplasm ratio of cells.
3. Disrupted tissue architecture.
4. Possible proliferative condition.

The findings are suggestive of a neoplastic process, and given the high cellularity and disorganized pattern, a malignant lesion such as a nasal cavity carcinoma or sinonasal carcinoma could be a potential diagnostic consideration.

Reference answer

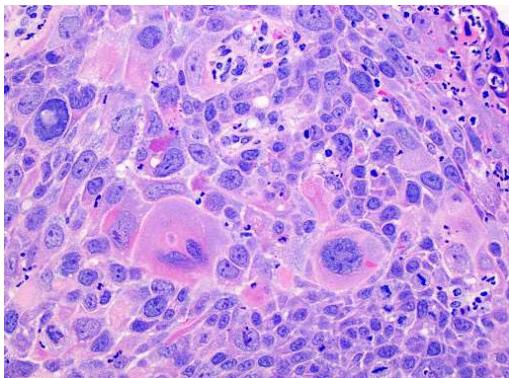
Sinonasal carcinoma. Higher magnification showing diffuse sheets of round blue cells with eosinophilic to clear cytoplasm, hyperchromatic nuclei and inconspicuous nucleoli; atypical mitoses are readily seen.

Figure 152 | Nasal cavity. This histopathological image shows a patch of WSI for sinonasal carcinoma from the tissue of nasal cavity. GPT-4V successfully finds the abnormalities according to the pathology image and provides a correct diagnosis option after given the prompt of tissue origin. The original image can be found in <https://www.pathologyoutlines.com/topic/nasalcarcinomageneral.html>.

Oral cavity

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Analysis

Description:

The provided image appears to be a histological slide observed under the microscope, most likely stained with hematoxylin and eosin (H&E). This is a common staining technique used in pathology to highlight cellular structures and tissue morphology.

Observations:

1. **Cellular Morphology:** The majority of cells in the field of view are characterized by a dark-stained nucleus and lighter-stained cytoplasm. The nuclear size and shape vary across cells, with some nuclei appearing larger and more prominent.

2. **Tissue Architecture:** The tissue displays a relatively dense cellular arrangement with closely packed cells. Some regions show cells with a clearer cytoplasmic boundary than

others.

3. **Noteworthy Features:** There are a few cells with particularly large, dark-stained nuclei, which might be indicative of some form of cellular activity or differentiation. There are also areas where the tissue appears less dense, with more extracellular space visible.

Preliminary Conclusion:

Based on the image alone and without additional context, it's challenging to pinpoint the exact tissue type or any potential pathological findings. It resembles epithelial tissue, which lines various structures and organs in the body. It is recommended to consult a pathologist or relevant expert for a detailed and accurate diagnosis or description.

Prompt

This is an image of oral cavity tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given the clarification that this is an image of oral cavity tissue and based on the previously mentioned observations:

The presence of cells with larger, dark-stained nuclei and the dense cellular arrangement are reminiscent of dysplastic changes. Dysplasia in the oral cavity is a precancerous change where there's an abnormal growth of cells on the epithelial lining. It's a spectrum ranging from mild to severe, and in some cases, it can progress to oral squamous cell carcinoma (OSCC).

Reference answer

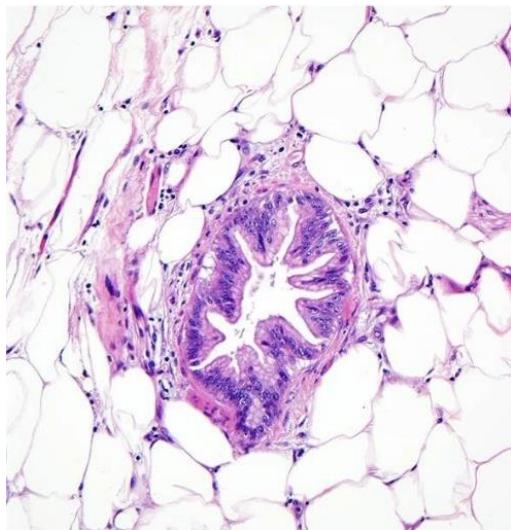
Oral cavity squamous cell carcinoma. Malignant epithelial cells with pleomorphism, abundant mitotic activity, intracellular bridges and hints of keratin formation.

Figure 153 | Oral cavity. This histopathological image shows a patch of WSI for oral cavity squamous cell carcinoma from the tissue of oral cavity. GPT-4V successfully identifies the epithelial tissue, finds the abnormalities and diagnoses correctly based on the image and the given prompt of tissue origin. The original image can be found in <https://www.pathologyoutlines.com/topic/oralcavityscc.html>.

Pancreas

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Examination Report

Image Description:

The provided image displays a microscopic view of tissue with cells stained in purple against a lighter background.

Observations:

1. Central to the image, there is a structure resembling a glandular profile. The lumen contains branching structures, indicative of a ductal system.
2. The cells lining the ductal structure appear to be cuboidal to columnar in nature, which is consistent with glandular epithelium.
3. Surrounding the glandular structure, there is a stroma with sparse cells, possibly fibroblasts or adipose tissue.
4. The overall architecture of the tissue appears to be intact with no overt signs of malignancy or dysplasia visible in this field of view.

Preliminary Assessment:

Based on the presented field of view, the tissue seems to be a section of glandular tissue, possibly from mammary or salivary glands. The tissue appears benign, but a comprehensive evaluation and correlation with clinical history and additional histological sections would be essential for a definitive diagnosis.

Prompt

This is an image of pancreas tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given that the image depicts pancreatic tissue and based on the previous observations:

Diagnostic Assessment:

The image displays a section of the exocrine pancreas, more specifically a pancreatic acinus. The acinus is the portion of the pancreas that produces digestive enzymes, which are secreted into the ductal system and ultimately into the small intestine. The following are notable points:

1. The cells lining the ductal structure, which are cuboidal to columnar, correspond to the ductal epithelium of the pancreas.
2. The branching pattern of the ducts seen in the image is typical of pancreatic ductal architecture.
3. The surrounding tissue, which might contain sparse cells possibly being fibroblasts or adipose cells, represents the interstitial tissue of the pancreas.

Based on the observations and the report provided, the most likely diagnostic result would be normal exocrine pancreatic tissue. There is no evidence of malignancy, inflammation, or other pathological processes in the provided field of view.

Reference answer

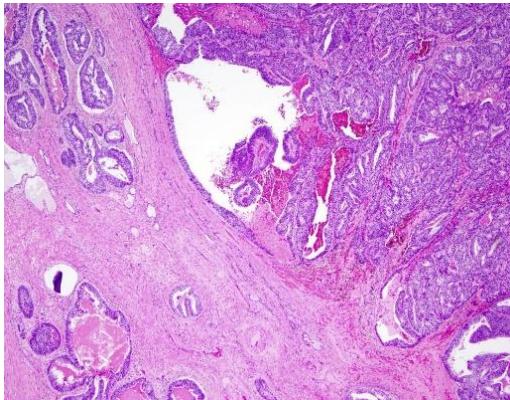
Ductal adenocarcinoma, NOS: Naked gland in peripancreatic adipose tissue (likely representing lymphovascular invasion)

Figure 154 | Pancreas. This histopathological image shows a patch of WSI for ductal adenocarcinoma from the pancreas tissue. GPT-4V identifies the glandular tissue structure from the image, but misdiagnoses the ductal adenocarcinoma as normal tissue. The original image can be found in <https://www.pathologyoutlines.com/topic/pancreasductal.html>.

Prostate

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Analysis

Image Description:

The image appears to be a microscopic view of a tissue sample, stained with hematoxylin and eosin (H&E), which is a common staining method in histology.

Observations:

1. Various cellular structures can be seen, including cells with nuclei (dark purple/blue areas) and the extracellular matrix.
2. There are ductal or glandular structures observed, which might suggest this is a section from glandular tissue.
3. Some of the ducts or glands seem to have lumens (central cavities).
4. The pink matrix surrounding the cells is indicative of the cytoplasm or stromal components.
5. There are areas with a higher cellular density, indicating potential regions of interest.

Preliminary Interpretation:

The tissue seems to be of epithelial origin, possibly from a glandular organ such as the breast, pancreas, or salivary gland. There appear to be both normal and potentially altered structures within the sample. However, a more detailed analysis by a trained pathologist would be necessary to provide a definitive diagnosis or interpretation.

Prompt

This is an image of prostate tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

The image you provided is of a microscopic view, and while I gave a general analysis in the previous response, it's essential to note that definitive diagnoses, especially in histopathology, require specialized training and often multiple levels of confirmation.

Given that you've mentioned this is prostate tissue, the presence of glandular structures aligns with that context. In the prostate, normal glandular structures can vary in appearance. Some features that pathologists look for when diagnosing prostate-related diseases include:

1. Changes in glandular architecture
2. Nuclear atypia (abnormal nucleus appearance)
3. Presence of any perineural invasion
4. Mitotic figures (indicating cell division)
5. The pattern of stromal and epithelial interactions

From the image provided, there are areas with a higher cellular density, suggesting potential regions of interest. However, without a more detailed view and examination of other areas of the tissue, it's difficult to ascertain whether there are any signs of benign conditions like benign prostatic hyperplasia (BPH) or more concerning features suggestive of prostatic adenocarcinoma or other malignancies.

Reference answer

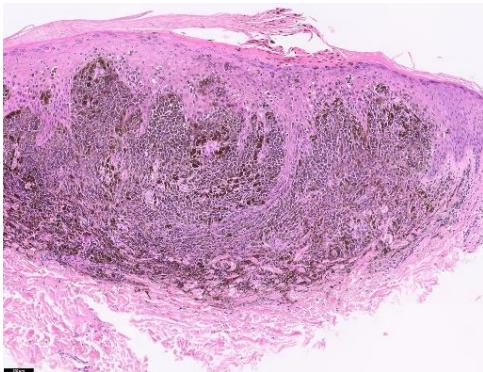
Prostate gland ductal adenocarcinoma: Prostatic ductal adenocarcinoma composed of tall pseudostratified columnar cells with simple glandular, cribriform and papillary patterns.

Figure 155 | Prostate. This histopathological image shows a patch of WSI for ductal adenocarcinoma from the prostate gland tissue. GPT-4V correctly identifies the glandular structures from the image, while it does not provide a reasonable diagnosis. The original image can be found in <https://www.pathologyoutlines.com/topic/prostateprostaticduct.html>.

Skin

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Report

Description:

The provided image depicts a histological section stained with what appears to be Hematoxylin and Eosin (H&E), the most widely used stain in medical diagnosis.

Observations:

1. The section displays a layered structure, suggestive of epithelial tissue.
2. The outermost layer appears thinner with elongated nuclei, likely representing the epidermis or a similar epithelial layer.
3. The underlying layer is denser with cells showing a darker stain, indicating the presence of cell nuclei. This could represent the dermis or a similar connective tissue layer if this is a skin sample.

4. There are regions in the section with glandular or follicular structures, implying the presence of sebaceous or sweat glands if it's a skin tissue.

5. The overall cellular architecture looks organized, but there is a noticeable cellular proliferation in certain areas.

Interpretation:

Without clinical context and higher magnification images, it's challenging to make a definitive diagnosis. The tissue section appears to be of epithelial origin, possibly skin. The observed cellular changes may be benign or indicative of a pathological process, so correlation with clinical findings is essential.

Prompt

This is an image of skin tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Based on the image and the provided report:

The image shows a histological section of skin tissue stained with Hematoxylin and Eosin (H&E). Given the layered structure, with an outermost layer representing the epidermis and a dense underlying layer likely representing the dermis, as well as the presence of glandular or follicular structures, this aligns well with typical skin histology.

However, the noticeable cellular proliferation in certain areas of the tissue is of concern. Such changes can be seen in a variety of conditions, from benign processes like skin inflammation or hyperplasia to more concerning conditions such as precancerous lesions or skin cancers.

A possible diagnostic consideration could be:

1. Benign skin conditions like hyperplasia, dermatitis, or other inflammatory skin disorders.
2. Precancerous lesions such as actinic keratosis or dysplastic nevi.
3. Skin malignancies, including basal cell carcinoma, squamous cell carcinoma, or melanoma, depending on the specific cellular features.

Reference answer

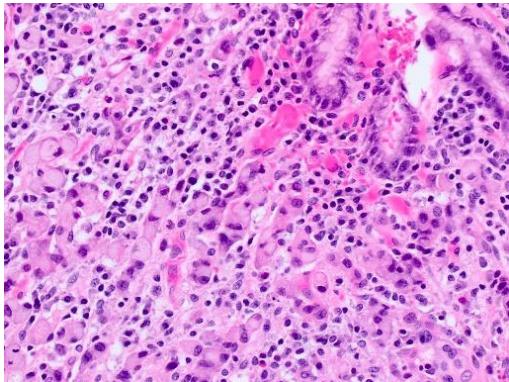
Invasive cutaneous melanoma: dermal nodular proliferation of dysplastic melanocytes; epidermal invasion; prominent pigmentation.

Figure 156 | Skin. This histopathological image shows a patch of WSI for invasive cutaneous melanoma from skin tissue. GPT-4V correctly identifies the tissue origin from the image and provides three potential diagnoses involving the right answer. The original image can be found in <https://www.pathologyoutlines.com/topic/skintumormelanocyticmelanoma.html>.

Stomach

Prompt

May you please write a report for this image?



GPT-4V

Certainly! The image provided appears to be a histological slide stained with hematoxylin and eosin (H&E), a common staining technique used in histology to visualize cellular and tissue structures.

Here's a brief description based on the image:

Histological Report

Specimen Description: The image displays a tissue section stained with hematoxylin and eosin (H&E).

Findings:

1. The tissue appears to have a dense cellular composition with both nucleated and non-nucleated cells.
2. The nuclei, stained purple with hematoxylin, vary in size and shape, suggesting a mixture of cell types. Some nuclei appear to be larger and darker, which could indicate hyperchromatic nuclei.
3. The pink eosinophilic regions represent the cytoplasm of cells or possible extracellular matrix components.
4. Certain areas show eosinophilic streaks, possibly indicating collagen fibers or other extracellular matrix elements.

Prompt

This is an image of stomach tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given the new information that this is stomach tissue, here's a more specific interpretation:

Histological Report of Stomach Tissue

Specimen Description: The image displays a section of stomach tissue stained with hematoxylin and eosin (H&E).

Findings:

1. The tissue appears to have a dense cellular composition suggestive of glandular structures, which are typical of gastric mucosa.
2. The nuclei vary in size and shape, with some appearing larger and darker. Hyperchromatic nuclei can sometimes be indicative of cellular atypia or dysplasia.
3. The pink eosinophilic regions represent the cytoplasm of cells. The presence of eosinophilic streaks could be indicative of muscularis mucosae or collagen deposits.

Preliminary Diagnosis: The cellular density and appearance of atypical nuclei raise concerns for possible gastric dysplasia or early neoplastic changes. However, the exact nature of these changes, whether benign, premalignant, or malignant, cannot be definitively determined from the image alone.

Reference answer

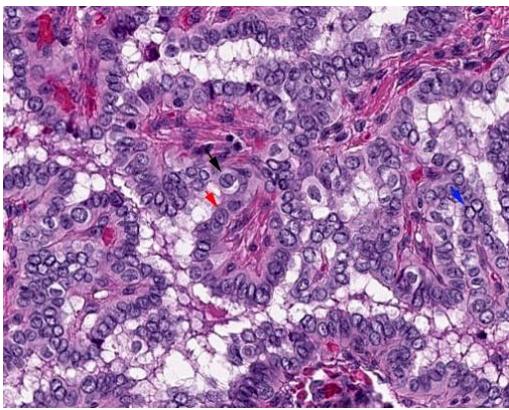
Sporadic diffuse gastric carcinoma arising in background of chronic gastritis. Scattered signet ring cells are present amidst the inflammation.

Figure 157 | Stomach. This histopathological image shows a patch of WSI for sporadic diffuse gastric carcinoma from stomach tissue. GPT-4V neither identifies the tissue origin nor provides the accurate disease. The original image can be found in <https://www.pathologyoutlines.com/topic/stomachdiffuse.html>.

Thyroid

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Analysis Report:

Image Description:

The image depicts a microscopic view of a tissue sample, which appears to be stained, likely using a hematoxylin and eosin (H&E) stain, a commonly used stain in histopathology.

Observations:

- Tissue Architecture:** The sample shows glandular structures, suggestive of epithelial tissue. The arrangement and morphology of the cells suggest a possible section of a glandular organ.
- Cellularity:** Cells appear closely packed with varying sizes. The nuclei of the cells are prominently stained, indicating the use of the hematoxylin stain.
- Staining Pattern:** The eosinophilic regions (pinkish-red) suggest the presence of cytoplasm and extracellular components, while the basophilic regions (darker purple)

indicate nuclear material.

4. **Marked Areas:** Black Arrow: This points to a cell with a prominent nucleus. The significance of this marking depends on the context of the study or observation. Red Arrow: Indicates a structure or feature within the cell or tissue, but without additional context, the specific significance remains unclear. Blue Arrow: Like the red arrow, it points to a specific structure or cell. Further information would be needed to deduce its exact significance.

Preliminary Interpretation:

Based on the provided image, the tissue appears to be of epithelial origin with glandular features. The marked areas suggest areas of interest or importance, but without additional context, it's challenging to determine the specific pathology or significance of these markings.

Prompt

This is an image of thyroid tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Possible Diagnostic Considerations:

- Nodular Hyperplasia or Thyroid Adenoma:** Given the appearance of closely packed follicles and varying cell sizes, one possibility is nodular hyperplasia or a benign thyroid adenoma. These are noncancerous enlargements of the thyroid.
- Papillary Thyroid Carcinoma:** This is the most common type of thyroid cancer. One hallmark is the presence of cells with large, clear "Orphan Annie" nuclei, although it's challenging to definitively diagnose this based solely on one image.
- Follicular Thyroid Neoplasm:** It can be benign (follicular adenoma) or malignant (follicular carcinoma). A definitive diagnosis between these two often requires evaluation of capsular or vascular invasion, which may not be evident in the provided image.

Reference answer

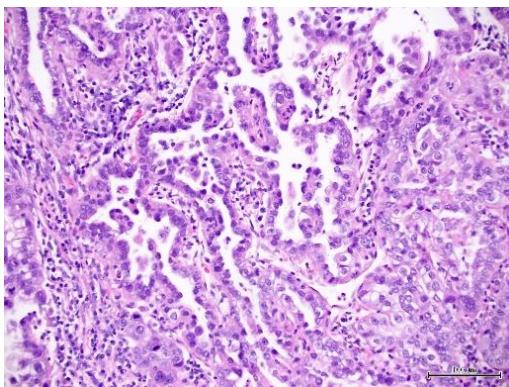
Papillary thyroid carcinoma: Classic variant has typical nuclear features of papillary thyroid carcinoma, e.g., nuclear enlargement, overlapping, marked nuclear membrane irregularity, nuclear groove (red arrow), nuclear pseudo-inclusion (black arrow) and chromatin margination (blue arrow).

Figure 158 | Thyroid. This histopathological image shows a patch of WSI for papillary thyroid carcinoma from thyroid tissue. GPT-4V correctly identifies the glandular structures from the image and provides three possible diagnostic results covering the right answer. The original image can be found in <https://www.pathologyoutlines.com/topic/thyroidpapillaryclassic.html>.

Uterus

Prompt

May you please write a report for this image?



GPT-4V

Microscopic Image Report

Image Description:

The image presents a microscopic view of a tissue sample, showing cellular structures with varying degrees of staining.

Staining:

The tissue appears to have been stained with hematoxylin and eosin (H&E). Hematoxylin stains the cell nuclei blue, while eosin stains the cytoplasm and extracellular matrix pink.

Morphological Observations:

- There are numerous glandular structures with luminal spaces present. The epithelial cells lining the glands appear columnar in shape, with basally located nuclei.
- The nuclei of the cells are predominantly oval to round, with some variation in size and staining intensity.
- The stroma surrounding the glandular structures appears

densely cellular.

- Some regions show closely packed glands, while others exhibit more stromal space.

Preliminary Assessment:

The tissue appears to be of epithelial origin, possibly from a glandular tissue like that of the digestive or reproductive system. The exact type of tissue and any potential pathological findings would require further examination and context about the source and clinical history.

Prompt

This is an image of uterus tissue. What is most likely diagnostic result based on the image and report?

GPT-4V

Given the information provided and the image of the uterus tissue, the tissue displays features consistent with endometrial tissue. The glandular structures and the appearance of the epithelial cells suggest this could be from the endometrial lining of the uterus. While a definitive diagnosis would require a comprehensive assessment by a trained pathologist, some potential considerations based on the image might include:

- Normal proliferative phase endometrium:** During the menstrual cycle's proliferative phase, the endometrial glands appear tubular with a regular shape, and the stroma is cellular.
- Endometrial hyperplasia:** This condition is characterized by an increased proliferation of the endometrial glands relative to the stroma. It can be a precursor to endometrial carcinoma, but not all hyperplasias progress to malignancy. Types of endometrial hyperplasia can include simple or complex hyperplasia and can be with or without atypia (atypical cellular features).
- Endometrial carcinoma:** This is a type of cancer that arises from the endometrium. It often presents with glandular structures that can vary in shape and size, with cells showing increased nuclear size, irregular nuclear contours, and increased mitotic activity.

Reference answer

Endometrial clear cell carcinoma. Admixed papillary and glandular architecture with clear cells and oxyphilic cells. Some lymphoplasmacytic inflammation is present in the stroma.

Figure 159 | Uterus. This histopathological image shows a patch of WSI for endometrial clear cell carcinoma from uterus tissue. GPT-4V correctly identifies the glandular structures from the image and provides three possible diagnostic results covering the right answer. This image can be found in <https://www.pathologyoutlines.com/topic/uterusclearcell.html>.

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