

T (Primary Tumor)	
TX	Primary tumor cannot be assessed, or tumor proven by the presence of malignant cells in sputum or bronchial washings but not visualized by imaging or bronchoscopy
T0	No evidence of primary tumor
Tis	Carcinoma in situ
T1	Tumor ≤3 cm in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (i.e., not in the main bronchus) ^a
T1a	Tumor ≤2 cm in greatest dimension
T1b	Tumor >2 cm but ≤3 cm in greatest dimension
T2	Tumor >3 cm but ≤7 cm or tumor with any of the following features (T2 tumors with these features are classified T2a if ≤5 cm) Involves main bronchus, ≥2 cm distal to the carina Invades visceral pleura Associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung
T2a	Tumor >3 cm but ≤5 cm in greatest dimension
T2b	Tumor >5 cm but ≤7 cm in greatest dimension
T3	Tumor >7 cm or one that directly invades any of the following: chest wall (including superior sulcus tumors), diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium; or tumor in the main bronchus <2 cm distal to the carina ^a but without involvement of the carina; or associated atelectasis or obstructive pneumonitis of the entire lung or separate tumor nodule(s) in the same lobe
T4	Tumor of any size that invades any of the following: mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body, carina; separate tumor nodule(s) in a different ipsilateral lobe

N (Regional Lymph Nodes)	
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes, including involvement by direct extension
N2	Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
N3	Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)
M (Distant Metastasis)	
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis
M1a	Separate tumor nodule(s) in a contralateral lobe; tumor with pleural nodules or malignant pleural (or pericardial) effusion ^b
M1b	Distant metastasis

TABLE 4. Descriptors, Proposed T and M Categories, and Proposed Stage Groupings

Sixth Edition T/M Descriptor	Proposed T/M	N0	N1	N2	N3
T1 (≤2 cm)	T1a	IA	IIA	IIIA	IIIB
T1 (>2–3 cm)	T1b	IA	IIA	IIIA	IIIB
T2 (≤5 cm)	T2a	IB	IIA	IIIA	IIIB
T2 (>5–7 cm)	T2b	IIA	IIB	IIIA	IIIB
T2 (>7 cm)	T3	IIIB	IIIA	IIIA	IIIB
T3 invasion		IIB	IIIA	IIIA	IIIB
T4 (same lobe nodules)		IIIB	IIIA	IIIA	IIIB
T4 (extension)	T4	IIIA	IIIA	IIIB	IIIB
M1 (ipsilateral lung)		IIIA	IIIA	IIIB	IIIB
T4 (pleural effusion)	M1a	IV	IV	IV	IV
M1 (contralateral lung)		IV	IV	IV	IV
M1 (distant)	M1b	IV	IV	IV	IV

Cells in bold indicate a change from the sixth edition for a particular TNM category.

Supplementary Figure 1. AJCC TNM Staging Guide (7th Ed. From (P. Goldstraw, et. al. 2007)).

Case TCGA-44-2656

MICROSCOPIC DESCRIPTION

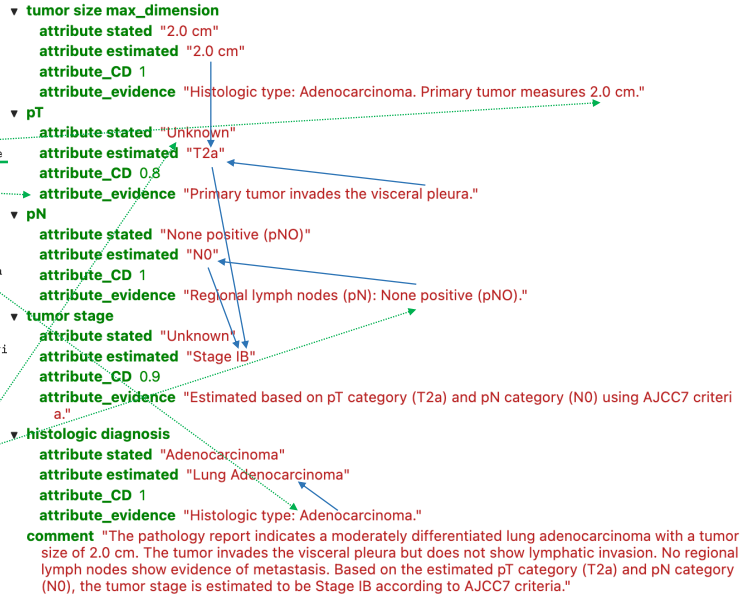
A.
 Histologic type: Adenocarcinoma.
 Histologic grade: Moderately differentiated.
 Primary tumor: Primary tumor measures 2.0 cm, but invades the visceral pleura.
 Margins of resection: Uninvolved.
 Direct extension of tumor: Not identified.
 Venous (large vessel) invasion: Identified.
 Arterial (large vessel) invasion: Identified.
 Lymphatic (small vessel) invasion: Not identified.
 Regional lymph nodes (pN): None positive (pN0).
 Distant metastasis (pM): Cannot be evaluated by this specimen

DIAGNOSIS

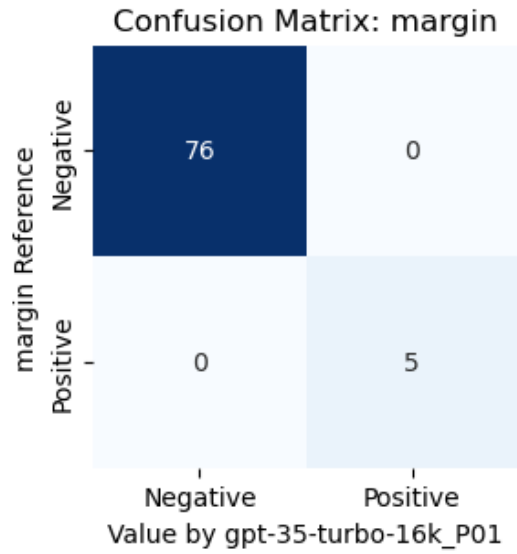
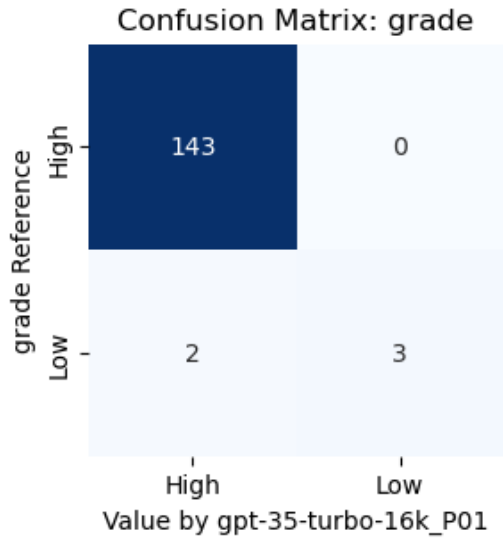
- A. Lung, right upper lobe, resection:
 - Adenocarcinoma, moderately differentiated, 2.0 cm. surgical margins uninvolved.
 - Nine lymph nodes with no evidence of metastasis.
 B. 2R lymph nodes, resection:
 - No evidence of metastasis the six lymph nodes (0/6).
 C. 4R lymph nodes, resection:
 - Two lymph nodes with no evidence of metastasis (0/2).
 D. Station 7 lymph nodes, resection:
 - No evidence of metastasis in three lymph nodes (0/3).
 - Granulomatous inflammation.
 E. Station 9 lymph node, metastasis:
 - One lymph node with no evidence of metastasis (0/1).

DIAGNOSIS

[REDACTED]



Supplementary Figure 2. Case TCGA-44-2656 shows that ChatGPT correctly extracted relevant information from the note and made sound inference about the pT category based on the AJCC guideline.



Supplementary Figure 3. The presented prompting strategy is applied structured data extraction from osteosarcoma clinic notes. The GPT model used for our experiment is GPT-3.5-Turbo-16K (version 0613) and it was deployed on dedicated AzureAI cloud service.

GPT Output: ▼ **Histologic Grade**

attribute stated "Histologic grade: Grade 3: Poorly differentiated, high grade"

attribute value "G3 (High)"

Histologic Grade_CD 1

Histologic Grade_evidence "The clinic note explicitly states the histologic grade as Grade 3: Poorly differentiated, high grade."

Case: P0034_C02

Relevant part of clinic note:

Histologic grade: Grade 3: Poorly differentiated, high grade
Margins: Uninvolved by sarcoma
Distance of sarcoma from closest margin: 0.2 cm
Specify margin: Anterior margin

▼ **Margin Status**

attribute stated "Margins: Uninvolved by sarcoma"

attribute value "Negative"

Margin Status_CD 1

Margin Status_evidence "The clinic note states that the surgical margins are uninvolved by sarcoma."

Supplementary Figure 4. An example to illustrate that the GPT model correctly captured histologic grade and margin category as well as the key evidence.

```
1  authenticate OpenAI API key
2  for each file in pathology report folder:
3      read in report
4      create instructive prompt for the report
5      estimate number of tokens of the prompt with tiktokens
6      if #tokens less than a threshold:
7          try:
8              construct chat message
9              create a ChatCompletion with a GPT model and the message
10             call OpenAI API and get the response
11             extract the GPT model output
12             write the GPT output to a file in GPT Output folder
13         except:
14             output message: the file is failed to get response
15             append the file to unprocessed filelist
16     else:
17         append the file to unprocessed filelist
```

Supplementary Figure 5. Algorithm of GPT-Powered Pathology Report Reader

Supplementary Table 1. Performance of ChatGPT, WordPiece tokenizer and NER Classifier in terms of pN, pT, overall tumor stage and histological diagnosis

A. primary tumor features (pT)	Accuracy	F1	Kappa	Recall	Precision
GPT-3.5-Turbo-16K	0.87	0.87	0.76	0.87	0.89
GPT-4-Turbo-1106-preview	0.91	0.91	0.84	0.91	0.92
NER Classifier	0.35	0.42	0.14	0.35	0.65
WordPiece tokenizer	0.74	0.75	0.55	0.74	0.78

B. regional lymph node involvement (pN)	Accuracy	F1	Kappa	Recall	Precision
ChatGPT	0.91	0.92	0.84	0.92	0.92
GPT-4-Turbo-1106-preview	0.95	0.95	0.91	0.95	0.96
NER Classifier	0.48	0.50	0.24	0.48	0.69
WordPiece tokenizer	0.70	0.71	0.46	0.70	0.74

C. overall tumor stage	Accuracy	F1	Kappa	Recall	Precision
GPT-3.5-Turbo-16K	0.76	0.76	0.61	0.76	0.77
GPT-4-Turbo-1106-preview	0.89	0.89	0.82	0.89	0.89
NER Classifier	0.30	0.28	0.06	0.30	0.51
WordPiece tokenizer	0.66	0.67	0.46	0.67	0.68

D. histological diagnosis	Accuracy	F1	Kappa	Recall	Precision
GPT-3.5-Turbo-16K	0.99	0.99	0.98	0.99	0.99
GPT-4-Turbo-1106-preview	0.99	0.99	0.98	0.99	0.99
NER Classifier	0.93	0.92	0.86	0.93	0.91
WordPiece tokenizer	0.93	0.92	0.86	0.93	0.92

E. Average	Accuracy	F1	Kappa	Recall	Precision
GPT-3.5-Turbo-16K	0.89	0.88	0.80	0.89	0.89
GPT-4-Turbo-1106-preview	0.94	0.94	0.89	0.94	0.94
NER Classifier	0.51	0.53	0.32	0.51	0.69
WordPiece tokenizer	0.76	0.76	0.58	0.76	0.78