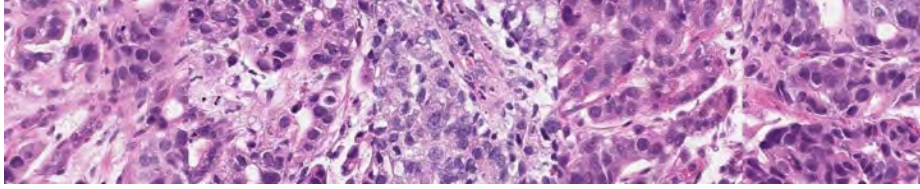


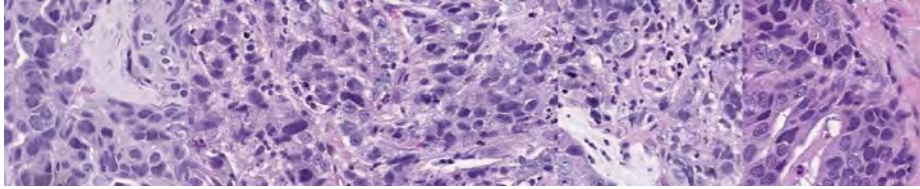
Supplementary Material

Table 5. Five case examples illustrate caption prediction results with BLEU@4 scores ranging from 0 to 1 in the test dataset.

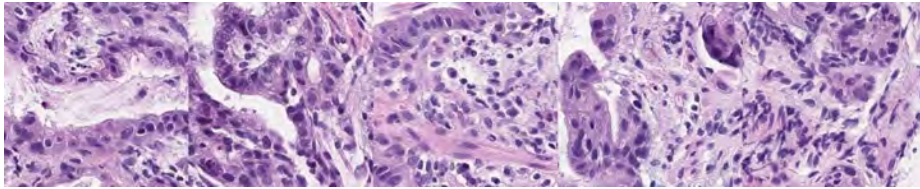
BLEU@4	Image id	Original caption	Predicted caption
0	12ffb560b9b54be8bf574c9e96804dcb	highly columnar epithelium with disordered nuclear localization proliferates showing fusion ductal construction	in the superficial epithelium, tumor tissue that invades by forming medium-sized to small, irregular ducts is observed
0.34	20a86214444542ebb703f47334620827	the superficial epithelium shows a large sheet-like shape, and some tumor tissue infiltrates with small irregular ducts	the superficial epithelium has a large amount of tumor tissue that infiltrates with small irregular ducts
0.58	76bec5ab16da4801b5a707c9c1a30542	in the superficial epithelium, tumor tissue that invades by forming medium-sized to small, irregular ducts is observed. tumor cells are columnar or cuboidal in shape	in the superficial epithelium, tumor tissue that invades by forming medium-sized to small, irregular ducts is observed
0.85	debebb808a1e45ea95656599098fea9c	tumor tissue consisting of cord-like or small, irregular glandular ducts fused and infiltrated is observed in the superficial epithelium	tumor tissue consisting of cord-like or small, irregular ducts fused and infiltrated is observed in the superficial epithelium
1	17770d23ffc8494c829b82591a73f7a5	from the superficial epithelium to the muscularis mucosae, tumor tissue consisting of medium-sized and irregular glandular ducts infiltrating is observed	from the superficial epithelium to the muscularis mucosae, tumor tissue consisting of medium-sized and irregular glandular ducts infiltrating is observed



Poorly differentiated adenocarcinoma



Moderately differentiated tubular adenocarcinoma



Well differentiated tubular adenocarcinoma

Fig. 2. Visualization of high attention score patches of each subtype. For each subtype, the top 5 patches with the highest attention scores are chosen. A board-certified pathologist confirms that PathM3 selects relevant morphological patterns for each subtype with high attention scores.

Table 6. Hyperparameters for PathM3.

Learning rate	$1e - 4$
Warmup learning rate	$1e - 5$
Warmup steps	1000
Weight decay	0.05
AdamW β	(0.9, 0.999)
Batch size	16
Image Encoder	ViT-g/14
LLM	FlanT5 _{XL}
Query embedding numbers	32
Query embedding dimension	768
Hidden dimension of query-based transformer	768
Layer dimension of query-based transformer	12
Hidden dimension of correlation module	1408