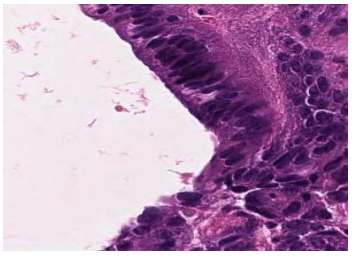
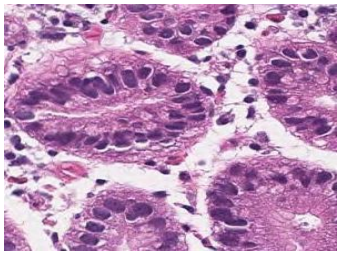
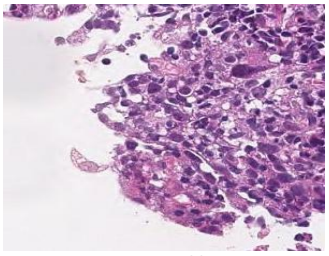
1. Visual Evaluation for the individual vision encoders with pre-trained Language embedding models

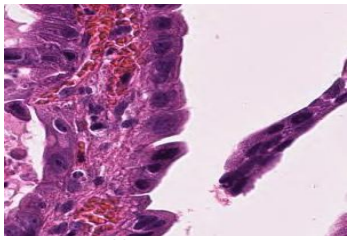
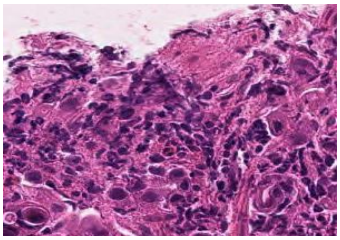
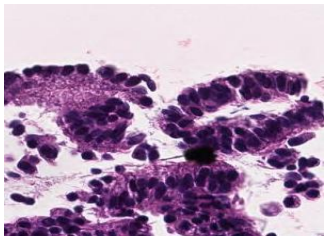
Different samples of the image captioning produced by the tested models are shown in the below figure, the input images are in the first row; while their corresponding labeled captions are in the second row. The captions in each box are from the same model sample. We show the captions from all the tested models in the following tows. It is clear that captioning sentences using augmentation with BioLinkBERT-Large is more accurate than using LSTM, especially when using the features by ConvexNEXT-Large model.

Model Name			
Original sentence	"Well differentiated tubular adenocarcinoma In the superficial epithelium tumor tissue that invades by forming medium-sized to small irregular ducts is observed Well differentiated tubular adenocarcinoma"	"Papillary adenocarcinoma On the superficial epithelium tumor tissue that infiltrates by forming medium-sized papillary or small irregular ducts is observed Papillary adenocarcinoma"	"Poorly differentiated adenocarcinoma non-solid type Tumor tissue consisting of cord-like or small irregular glandular ducts fused and infiltrated is observed in the superficial epithelium Poorly differentiated adenocarcinoma non-solid type"
Without augmentation	"well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma"	"well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma"	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"
With augmentation SWIN	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"
Augmentation with BioLinkBERT	"well differentiated tubular adenocarcinoma from the superficial epithelium to the	"well differentiated tubular adenocarcinoma in the superficial epithelium	"moderately differentiated tubular adenocarcinoma in the superficial epithelium

		muscularis mucosae tumor tissue consisting of medium sized and irregular glandular ducts infiltrating is observed well differentiated tubular adenocarcinoma”	tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”	tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”
Without augmentation		“differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma”	“well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma”	“poorly differentiated adenocarcinoma non solid type tumor tissue consisting of cord like or small irregular glandular ducts fused and infiltrated is observed in the superficial epithelium poorly differentiated adenocarcinoma non solid type”
With augmentation	ConvNEXT	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”
Augmentation with BioLinkBERT		“well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”	“well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”

2. Visual Evaluation for the encoders using feature concatenation models with pre-trained Language embedding models

Different samples of the image captioning produced by the tested models are shown in the below figure, the input sample images are shown in the top row, while the second row shows their corresponding original labeled captions. The captions in each box are from the same model sample. The following rows show the captions generated from all the concatenated tested models. It is clear that captioning sentences using augmentation with BioLinkBERT-Large is more accurate than using LSTM, especially with using the features by ConvexNEXT-Large with PVT_v2_b5 model

Model Name			
Original sentence	"Well differentiated tubular adenocarcinoma In the superficial epithelium tumor tissue that invades by forming medium-sized to small irregular ducts is observed Well differentiated tubular adenocarcinoma"	"Moderately to poorly differentiated adenocarcinoma Medium to small irregular glandular ducts are formed in the superficial epithelium and in some cases the glandular ducts are fused to show solid alveolar lesions and infiltrating tumor tissue is observed Moderately to poorly differentiated adenocarcinoma"	"Papillary adenocarcinoma Tumor cells are large highly columnar large club-shaped nuclei and are associated with chromatin aggregation Papillary adenocarcinoma"
LSTM	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"
SWIN + PVT BioLinkBERT	"well differentiated tubular adenocarcinoma from the superficial epithelium to the muscularis mucosae tumor tissue consisting of medium sized and irregular glandular ducts infiltrating is observed well differentiated tubular	"moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma"	"well differentiated tubular adenocarcinoma from the superficial epithelium to the muscularis mucosae tumor tissue consisting of medium sized and irregular glandular ducts infiltrating is observed well differentiated tubular adenocarcinoma"

		adenocarcinoma”		
LSTM	SWIN + ConvNEXT	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma well differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed well differentiated tubular adenocarcinoma”
BioLinkBERT				
LSTM	ConvNEXT + PVT	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma well differentiated tubular adenocarcinoma from the superficial epithelium to the muscularis mucosae tumor tissue consisting of medium sized and irregular glandular ducts infiltrating is observed well differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma”	“moderately differentiated tubular adenocarcinoma in the superficial epithelium tumor tissue that invades by forming medium sized to small irregular ducts is observed moderately differentiated tubular adenocarcinoma well differentiated tubular adenocarcinoma from the superficial epithelium to the muscularis mucosae tumor tissue consisting of medium sized and irregular glandular ducts infiltrating is observed well differentiated tubular adenocarcinoma”
BioLinkBERT				