

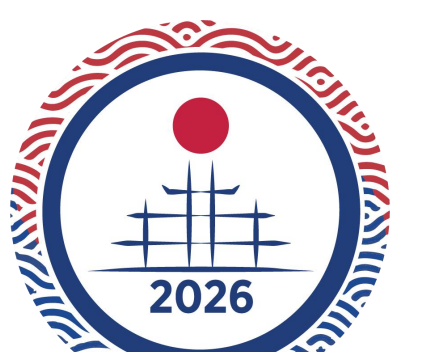


PT1.07.01: Intraoperative grading of early lung adenocarcinoma via macroscopic figures, CT Imaging, and textual reports (MaCTex)

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INTRODUCTION

Clinical Need

- Intraoperative frozen section (FS) guides surgical resection and lymph node dissection in stage IA lung adenocarcinoma (LUAD) but suffers from sampling bias, delays, and diagnostic inconsistency.

Objective

- We developed and validated MaCTex, integrating preoperative CT images and radiology reports with intraoperative macroscopic images for five-class LUAD classification as a potential adjunct to FS.

METHODS

Study Cohort

- Patients with stage IA LUAD who underwent complete resection at GDPH, GDMUAH, or MZPH between June 2020 and September 2023 were included.

Data Acquisition

- Preoperative CT images and radiology reports obtained within 1 month before surgery were collected. Intraoperative macroscopic images were smartphone-captured under natural lighting.

Model Development

- MaCTex was developed for five-class pathological classification: AIS, MIA, and IAC grades 1–3. Postoperative paraffin histopathology served as the reference standard. The study was registered with ChiCTR (ChiCTR2500111776).



DISCUSSION AND CONCLUSION

Key Findings

- MaCTex integrated preoperative CT images, radiology reports, and intraoperative macroscopic images for five-class pathological classification of early-stage LUAD.

Clinical Implications

- MaCTex may mitigate frozen-section sampling limitations and support intraoperative pathological assessment and surgical decision-making.

RESULTS

Dataset Composition

- The study included 1,344 nodules from 1,231 patients at GDPH, 122 nodules from 111 patients at GDMUAH, and 88 nodules from 82 patients at MZPH. All nodules were paired with corresponding preoperative CT scans and intraoperative macroscopic images.

MaCTex Performance

- MaCTex achieved macro-average AUROCs of 0.892, 0.868, and 0.849 at GDPH, GDMUAH, and MZPH, respectively.

Incremental Multimodal Gains

- Macro-average AUROC progressively increased from 0.817 with the CT Model to 0.855 with the CT + Text Model and 0.892 with MaCTex at GDPH; from 0.827 to 0.843 and 0.868 at GDMUAH; and from 0.797 to 0.830 and 0.849 at MZPH.

RESULTS

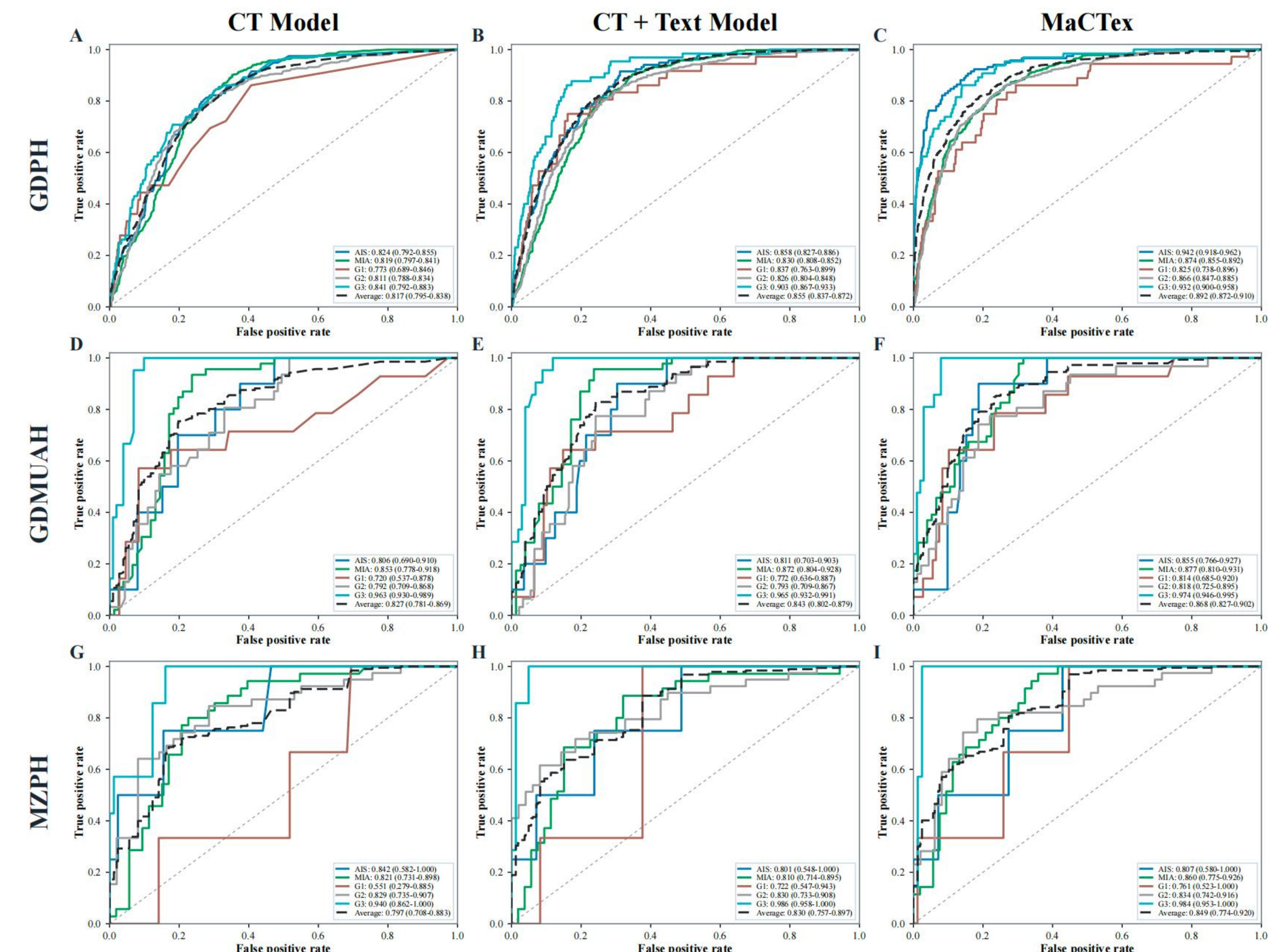


Figure 1. ROC curves of the CT Model, CT + Text Model, and MaCTex for five-class IASLC grading in GDPH (A–C), GDMUAH (D–F), and MZPH (G–I).

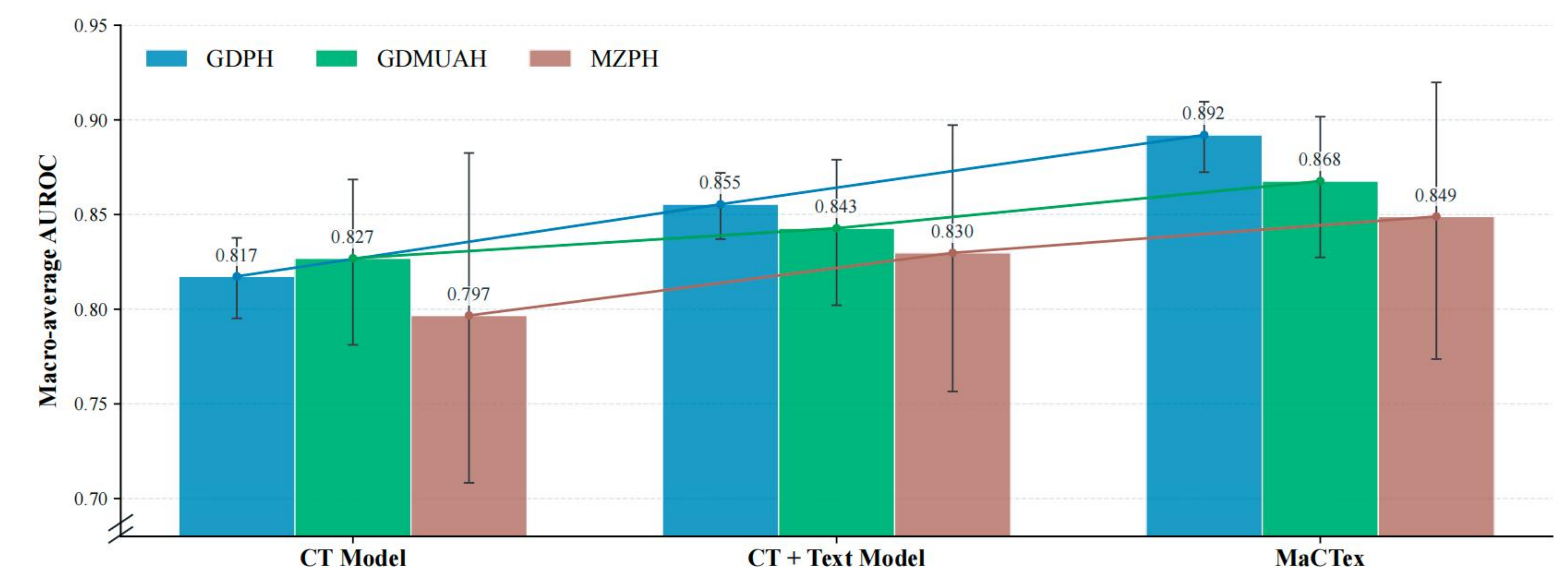


Figure 2. Incremental macro-average AUROCs (95% CIs) of the CT Model, CT + Text Model, and MaCTex in GDPH, GDMUAH, and MZPH.