

Project Summary — PhD Application

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Supervisor: Prof. Hyuk-Joon Lee
Institution: Seoul National University Hospital
Target start: September 2027

Proposed thesis: Prospective validation of station-specific lymph-node metastasis risk guidance for KLASS-standardized gastrectomy — integrating preoperative risk factors with intraoperative visual features, validated against disease-free survival and KLASS-02-QC quality metrics.

RESEARCH AIMS → TECHNICAL PREPARATION

AIM	RESEARCH QUESTION	PROOF-OF-CONCEPT PROJECT	REPOSITORY	DATA STATUS
Aim 1	Transparent station-level prevalence visualization for professor-facing review	Interactive descriptive prototype for 11 perigastric stations using published T-stage prevalence; individualized calibration remains future work	the-station-risk-map	⚠ Scaffold
Aim 2	Quality metric extraction linked to survival outcomes	TNM heatmaps, Kaplan-Meier curves, stage distributions from TCGA STAD	the-gastric-cancer-staging-visualization	✓ Public data
Aims 1-2	Ensuring clinical trustworthiness: discrimination, calibration, clinical utility	TRIPOD/PROBAST validation implementation (AUC, Brier, ECE, decision curves)	the-medical-ai-validation	✓ TCGA STAD
Foundation	Surgical instrument segmentation from laparoscopic video	DeepLabV3 pipeline: CholecSeg8k CV plus SISVSE transfer run; zero-shot IoU 0.064 → fine-tuned IoU 0.491 on 480 public robotic-gastrectomy frames	the-surgical-instrument-segmentation	Public transfer evidence

All repositories: github.com/Herbert-Research · Independent building blocks on public data — not an integrated system. Scaffold values are literature-derived placeholders, not validated for clinical use.

QUALIFICATIONS & EXPERIENCE

Clinical:	11 weeks SNUH GI Surgery (97 procedures observed, Prof. Lee's service)	Publication:	Dressler & Choi et al., JMBS 2025;14(2):85-96 (co-authored with Prof. Lee)
Research:	Principal coordinator, ENiMoN RCT (80-patient robot-assisted nephrectomy trial)	Training:	M.D., University of Heidelberg · Surgical residency starting July 2026 (Würzburg)
Language:	German (native), English (fluent), Korean (studying, targeting TOPIK 3 by 2027)	Commitment:	Korea long-term: language preparation, relocation plan, and surgical-academic career target at SNUH

RESEARCH QUESTIONS

- RQ1** Can preoperative variables estimate station-specific nodal risk for KLASS-standardized surgical planning?
- RQ2** Can gastrectomy video features improve risk reasoning and surgical-quality assessment?
- RQ3** Can public CholecSeg8k/SISVSE transfer work become valid SNUH robotic-gastrectomy evidence after IRB/privacy approval?

THREE-YEAR PHD TIMELINE

YEAR 1 (2027-28)

IRB approval · Data governance · Video capture protocols · Baseline station-specific risk models from KLASS registry (Aim 1) · Pre-register analyses · 60-80 cases

YEAR 2 (2028-29)

Intraoperative visual feature integration · Quality metric extraction + reliability validation (Aim 2) · Feasibility study · 150-200 total cases

YEAR 3 (2029-30)

Internal validation with subgroup analyses · Multimodal fusion pilot (Aim 3, exploratory) · Dissertation · Multicenter protocol drafted

WHY SNUH / PROF. LEE

This research requires high-volume KLASS-standardized gastrectomy, mature prospective registries, established quality metrics (KLASS-02-QC), and active surgical technology research. No other institution combines these elements. My 11-week immersion on Prof. Lee's service and our co-authored publication confirm productive collaboration. Negative results are equally valuable within this validation-first framework — demonstrating where AI does not yet warrant clinical integration provides evidence-based boundaries for deployment.