

Title: AI Starter: Medical Image Analysis for Cholangiocarcinoma Projects

BACKGROUND

Why This Matters

Cholangiocarcinoma (CCA) presents unique diagnostic challenges:

- Early detection is critical but difficult with current imaging methods
- Radiologists need AI tools specifically designed for bile duct pathology
- Most AI applications in radiology focus on other organ systems

The Problem:

- Limited radiologist involvement in AI development for CCA
- Lack of accessible tools for clinicians without programming expertise
- Need for standardized approaches to medical image analysis in CCA

Our Solution: An educational framework empowering radiologists and clinicians to initiate AI projects for CCA imaging analysis without extensive programming knowledge.

IMPACT & CLINICAL SIGNIFICANCE

Radiologists can successfully develop AI tools for CCA imaging without extensive programming expertise

Transfer learning significantly improves model performance with limited training data

Open-source frameworks (MONAI, PyTorch) enable reproducible research

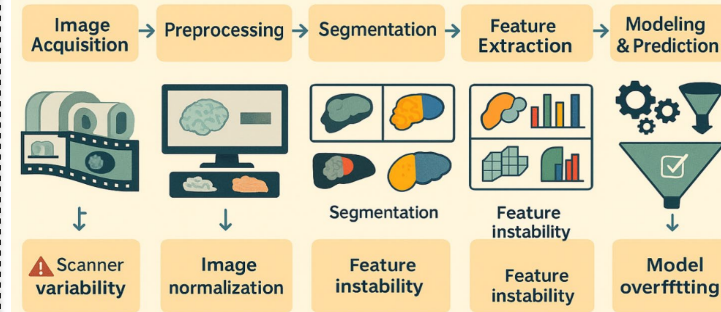
Clinical Potential:

- **Early Detection**
- **Treatment Planning**
- **Prognostic Assessment**

Key Limitations:

- Dataset size limits generalizability across all CCA presentations
- Need for prospective validation in clinical workflow
- Annotation variability despite multi-reader consensus

AI PIPELINE



FUTURE DIRECTIONS

Multi-center Validation Study

Expand dataset to 1,000+ cases across 5 international institutions

Real-time Clinical Integration

Develop PACS-integrated tool for intraoperative decision support

Multimodal AI System

Combine imaging with lab values (CA 19-9, bilirubin) and clinical history

Long-term Vision:

Personalized Risk Stratification: Predict recurrence risk post-resection

Therapeutic Response Monitoring: Track treatment efficacy through automated measurements

Educational Platform: Expand "AI Starter" framework to other rare cancers
Collaboration Opportunities: We invite institutions to contribute data and expertise to this growing initiative.

WHY IS CCA IDEAL FOR AI DEVELOPMENT?

- Complex Imaging Patterns
- High Inter-reader Variability
- Time-Intensive Analysis
- Rare Disease with Limited Expertise

HOW DOES AI BENEFIT PATIENTS IN CLINICAL PRACTICE?

- Earlier Detection = Better Outcomes
- Faster Diagnosis
- Accessible Expert-Level Care
- Treatment Response Monitoring

WHAT ARE THE CURRENT LIMITATIONS AND RISKS OF AI IN CCA DIAGNOSIS?

- Small training datasets limit generalizability
- Bias toward well-represented populations
- Validation gap between research and clinical reality