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# A Comparative Study of VLMs for Medical Image Analysis: CheXagent and MAIRA-2



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## Workforce Gaps & Report Quality – Challenges in Radiology

- Radiology faces workforce shortage in several countries
- Consistently high-quality radiology reports are critical in healthcare
- Traditional AI models focus on single domains and tasks
- VLMs offer multi-modal capabilities, enabling full-report generation
- Goal: Evaluate recently developed VLMs on radiology tasks to understand their practical utility

## Model Comparison

**CheXagent**  
3.1 billion parameters

**CheXinstruct**  
8.5 million samples

**Published**  
January 2024

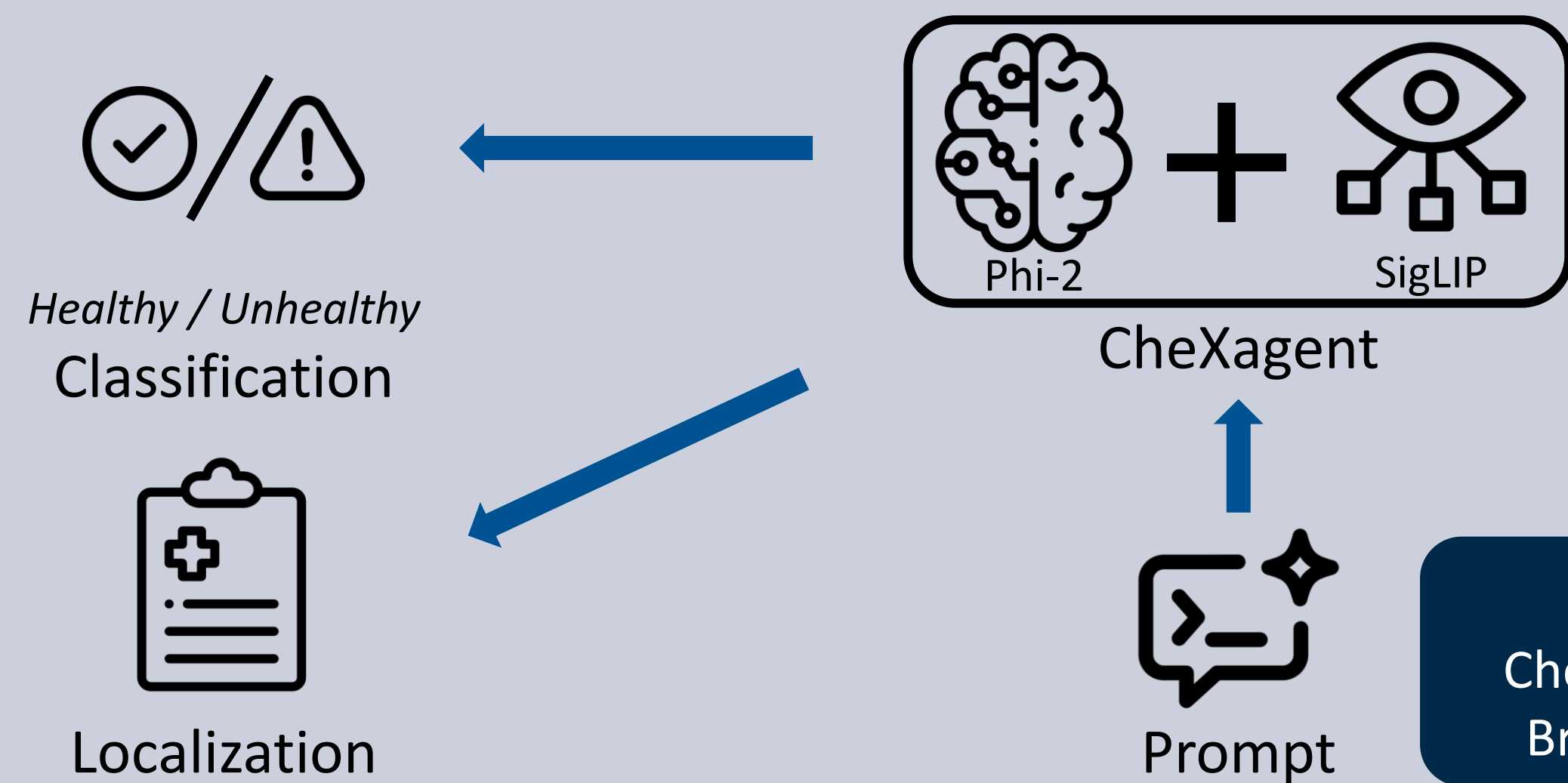
**MAIRA-2**  
6.9 billion parameters

**Training Data**  
0.2 million samples

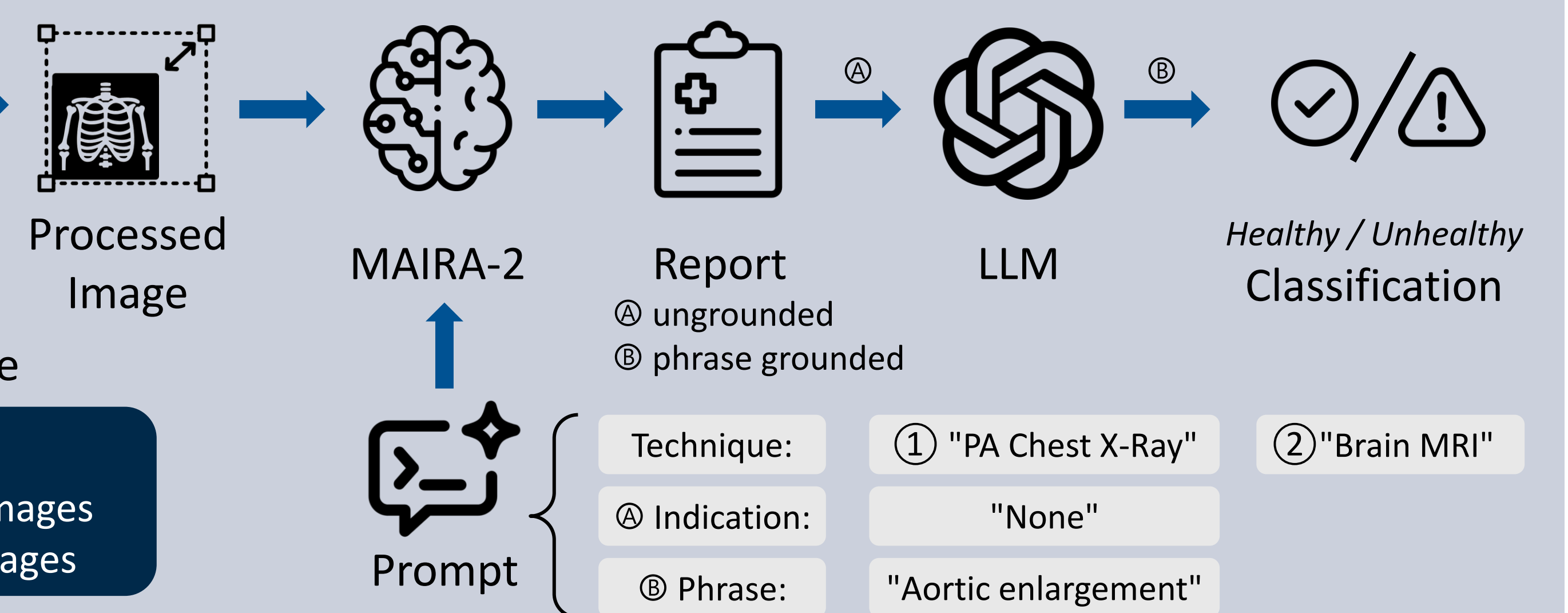
**Published**  
June 2024

## Methods

### CheXagent



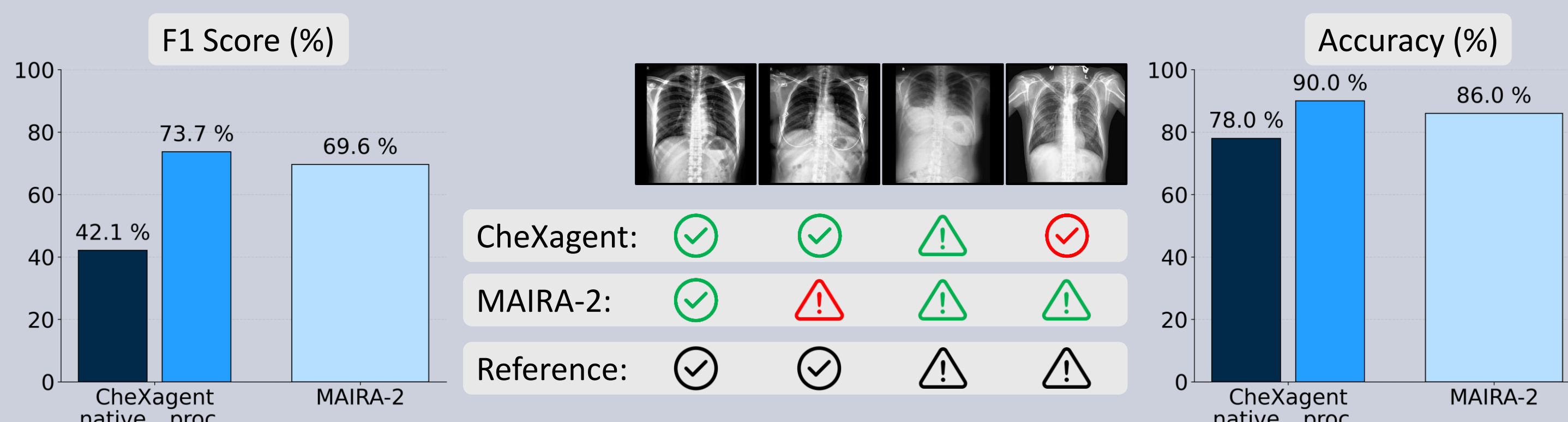
### MAIRA-2



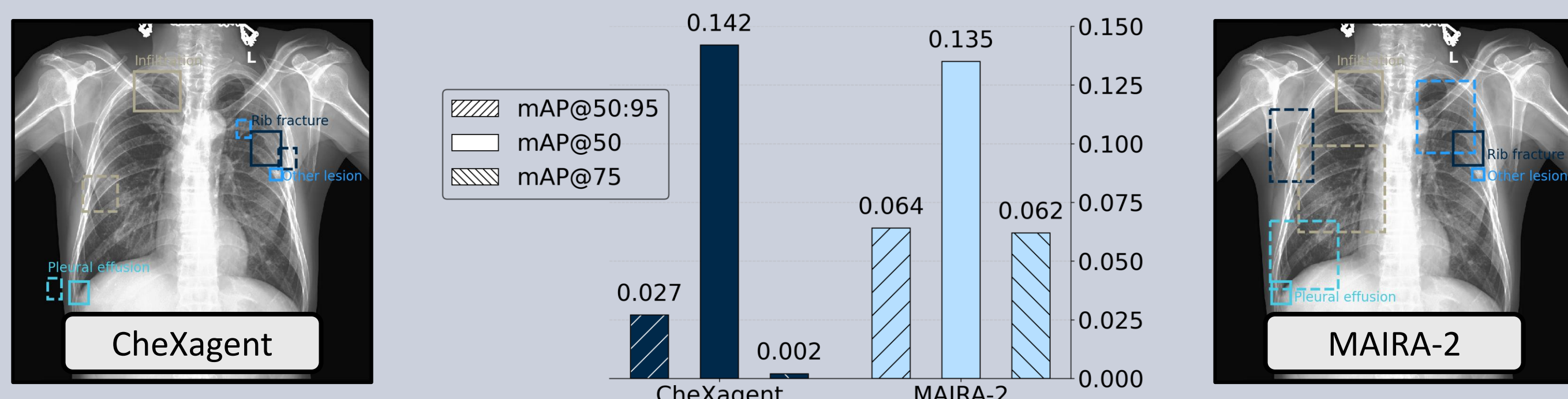
## Results & Evaluation

### Chest X-Ray

#### Classification: Healthy vs. Unhealthy

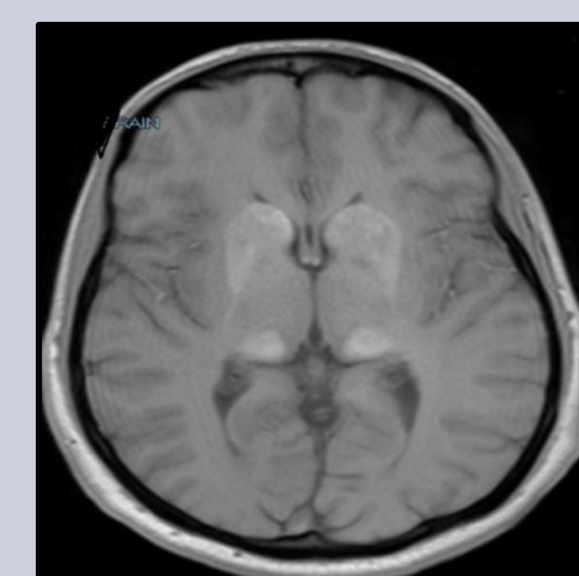


#### Localization: Given Disease



### Brain MRI

**Reference:** T1 sequence showing high signal in basal ganglia bilaterally



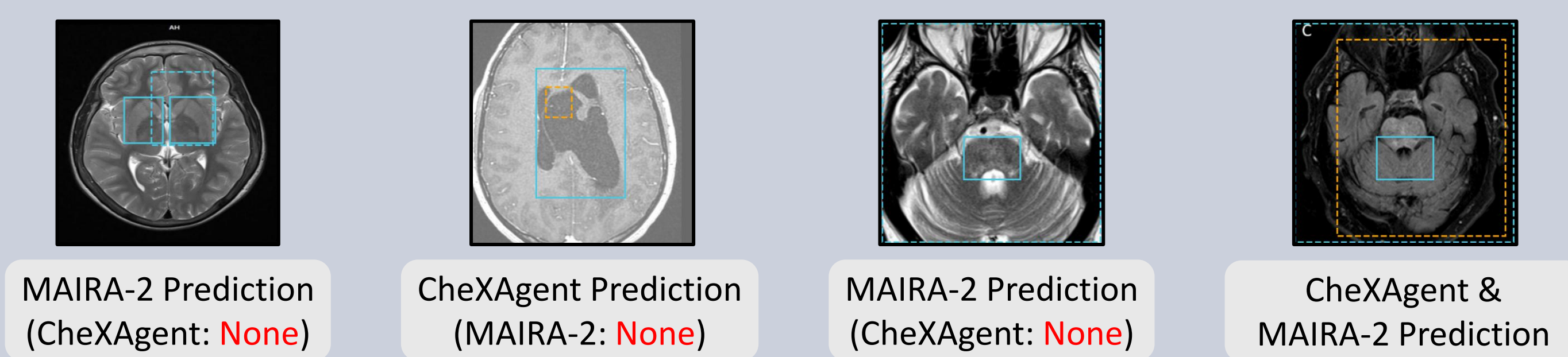
#### Description Generation

**CheXagent:** **Chest X-ray** showing bilateral hyperdense bones.

**MAIRA-2:** A right **chest tube** has been placed. The right **pneumothorax** has resolved. **Lungs** are hyperexpanded. **Heart** size is normal.

**Both models fail at cross-domain generalization**

#### Localization: All Abnormalities



## Conclusion

- Strong in-domain performance for classification tasks
- Grounding tasks still require improvements for possible clinical applications
- Cross-domain generalization with brain MRI completely fails

## Selected References

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- [4] C. I. Bercea *et al.*, "NOVA: A Benchmark for Anomaly Localization and Clinical Reasoning in Brain MRI," *arXiv preprint arXiv:2505.14064*, May 2025.