

# Lecture 17 - Contents

An overview of the main sections in this lecture.

## Part 1

Emergency Medicine Case Studies

## Part 2

Radiology Applications

## Part 3

Clinical Workflows and Integration

## Hands-on

Case Study Analysis

This outline is for guidance. Navigate the slides with the left/right arrow keys.



Lecture 17:

# Real-World Case Studies

## Medical AI in Practice: Real-World Success Stories

*Case Study Collage, Hospital Logos*

# Case Studies Overview

## Case Categories

Emergency Medicine

Radiology Applications

Clinical Trials & Drug Development

Population Health Management

## Success Factors

- ✓ Clear definition of clinical problems
- ✓ Data quality and accessibility
- ✓ Close collaboration with healthcare professionals
- ✓ Gradual implementation and validation
- ✓ Continuous monitoring and improvement

## **Part 1/3:**

# **Emergency Medicine Applications**

- 1.** Emergency Department Triage System
- 2.** Early Sepsis Prediction
- 3.** Stroke Detection
- 4.** Chest Pain Evaluation
- 5.** Resource Allocation Optimization
- 6.** Performance Metrics & Implementation Challenges

# Emergency Department Triage System

ESI (Emergency Severity Index) Automation

## Triage Flow

**1**

Immediate

**2**

Emergent

**3**

Urgent

**4**

Less Urgent

**5**

Non-Urgent

### AI System Performance

- Accuracy:**92%**
- Processing Time:**30 sec reduction**
- Nurse Burden:**40% decrease**
- Mis-triage Rate:**5% improvement**

### Key Features

- Real-time vital sign analysis
- Symptom-based priority determination
- Past medical record integration
- Healthcare staff final approval system

# Early Sepsis Prediction

## Prediction Model Input Features

Temperature

Heart Rate

Blood Pressure

Respiratory Rate

White Blood Cell Count (WBC)

Oxygen Saturation (SpO2)

Lactate Level

Urine Output

Consciousness Level (GCS)

## ROC Curve Performance

AUC-ROC	<b>0.89</b>
Sensitivity	<b>85%</b>
Specificity	<b>87%</b>
Positive Predictive Value (PPV)	<b>82%</b>

## Clinical Impact

Early Detection	<b>4-6 hours</b>
Mortality Reduction	<b>15%</b>
ICU Stay Reduction	<b>2.3 days</b>
Time to Antibiotics	<b>1 hr faster</b>

- 🔔 Real-time risk score calculation
- 🔔 Automatic high-risk patient alerts
- 🔔 Mobile push notifications for healthcare staff

# Stroke Detection

Automated CT Scan Analysis

## Imaging Analysis Features

- Hemorrhagic stroke detection
- Ischemic stroke identification
- Aneurysm detection
- Lesion size measurement
- ASPECTS score auto-calculation
- Vessel occlusion location identification

## AI Model Performance

- Accuracy: 94%
- Sensitivity: 96%
- Specificity: 93%
- Processing Time: <5 min
- False Positive Rate: 3%
- Comparable to neurologist



Time to Treatment Reduction

Diagnosis Time

**15min**

Thrombectomy Prep

**30min**

Total Treatment Start

**45min**

**"Time is Brain"** - 1.9 million neurons lost per minute of delay

# Chest Pain Evaluation

## Risk Stratification Algorithm

### High Risk

Immediate cath lab prep  
Emergency coronary angiography

### Medium Risk

Intensive monitoring  
Cardiac biomarker tracking

### Low Risk

Outpatient follow-up  
Early discharge possible

## AI Assessment Results

Acute MI Detection Rate **98%**

False Negative Rate **0.5%**

Unnecessary Admission Reduction **30%**

Assessment Time **10 min**

## Clinical Improvement

Early Diagnosis **2 hr faster**

Unnecessary Tests **25% reduction**

ED Length of Stay **1.5 hr reduction**

Patient Satisfaction **15% increase**

# Resource Allocation Optimization

## Allocation System Features



### Bed Management

Real-time bed status tracking



### Staff Allocation

Demand-based deployment



### Ambulances

Optimal routing



### Medication Inventory

Automatic demand forecasting



### Lab Scheduling

Priority-based booking



### OR Management

Time optimization

## Efficiency Improvements

Bed Turnover Rate **+22%**

Wait Time Reduction **35 min**

Resource Utilization **85% → 95%**

## Cost Savings

Operating Costs **-12%**

Overtime **-28%**

Inventory Waste **-15%**

Staff Allocation Optimization

+18%

Annual Savings

\$2.5M

# Performance Metrics

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Implementation Challenges

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

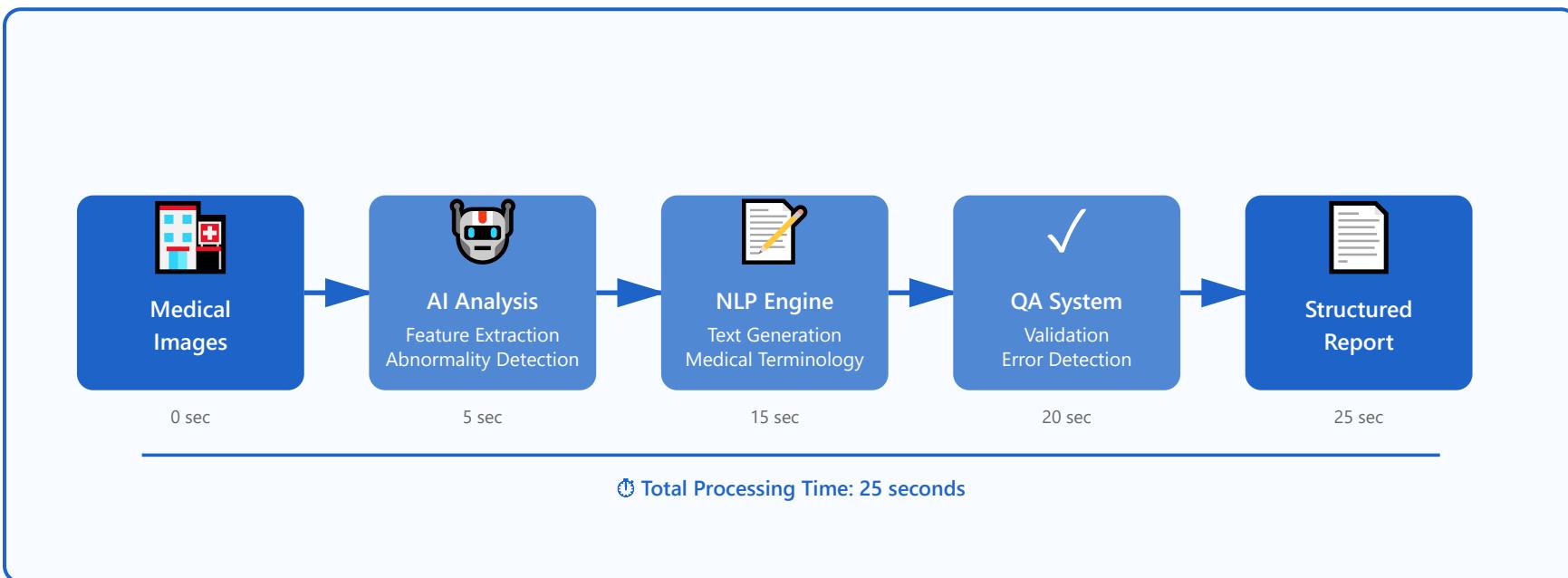
Result 3

**Part 2/3:**

## **Radiology AI Deployments**

- 1.** Automated Report Generation Pipeline
- 2.** Finding Detection
- 3.** Priority Queuing System
- 4.** Quality Assurance
- 5.** Radiologist Workflow Integration
- 6.** PACS Integration

# Automated Report Generation Pipeline



Processing Speed

**25sec**

Accuracy

**96%**

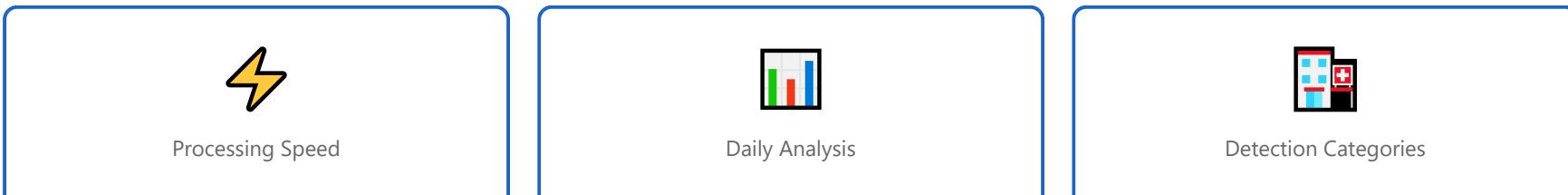
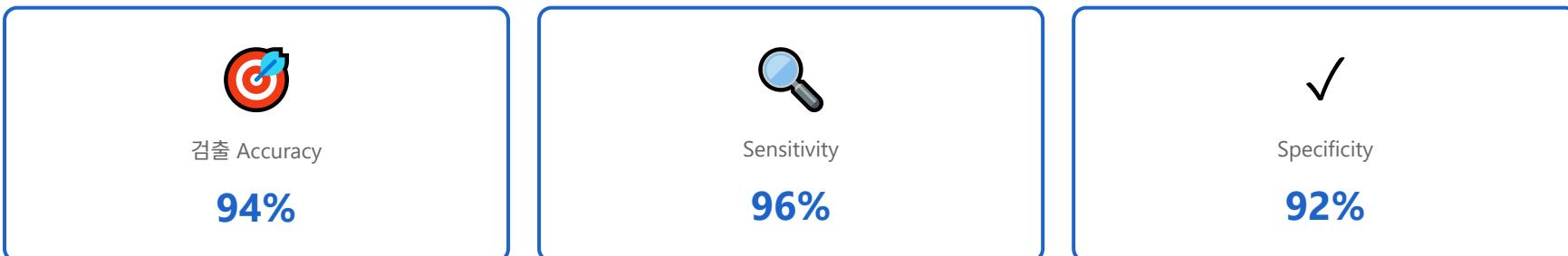
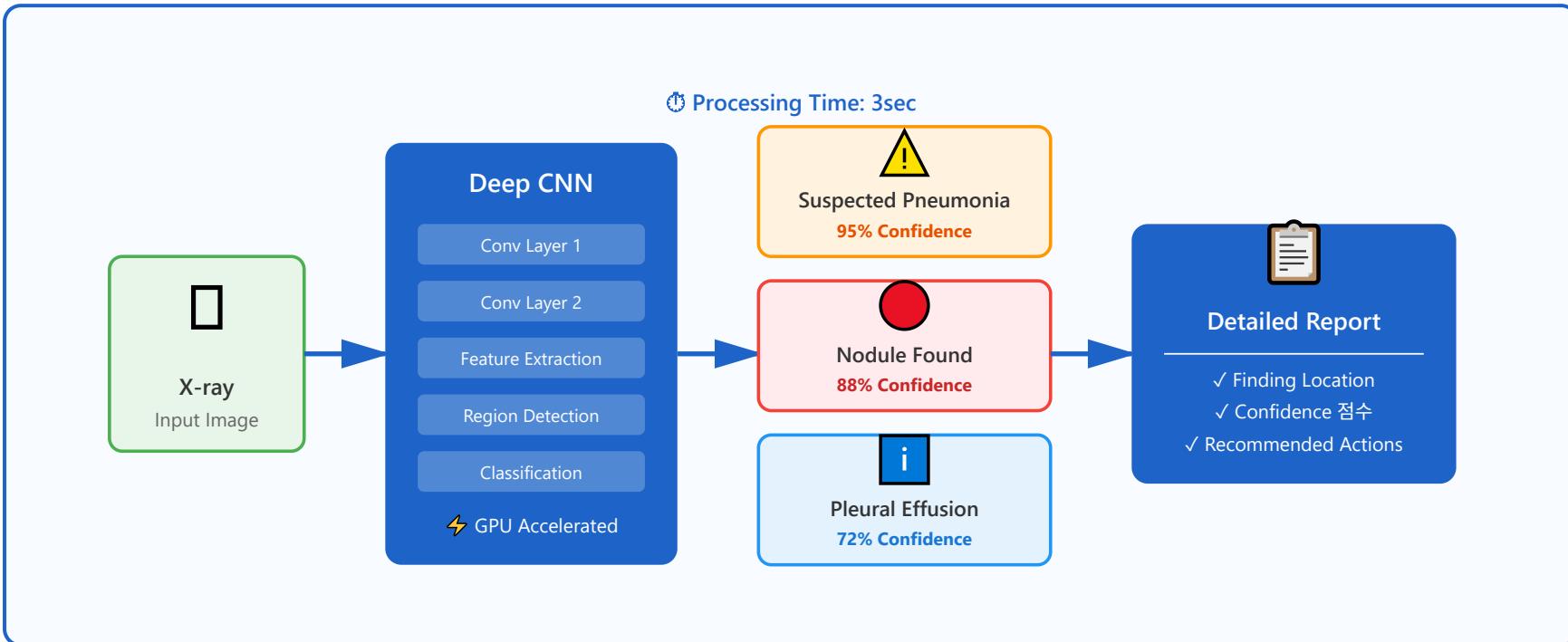
Time Saved

**80%**

Daily Throughput

**500+**

# Finding Detection (Finding Detection)

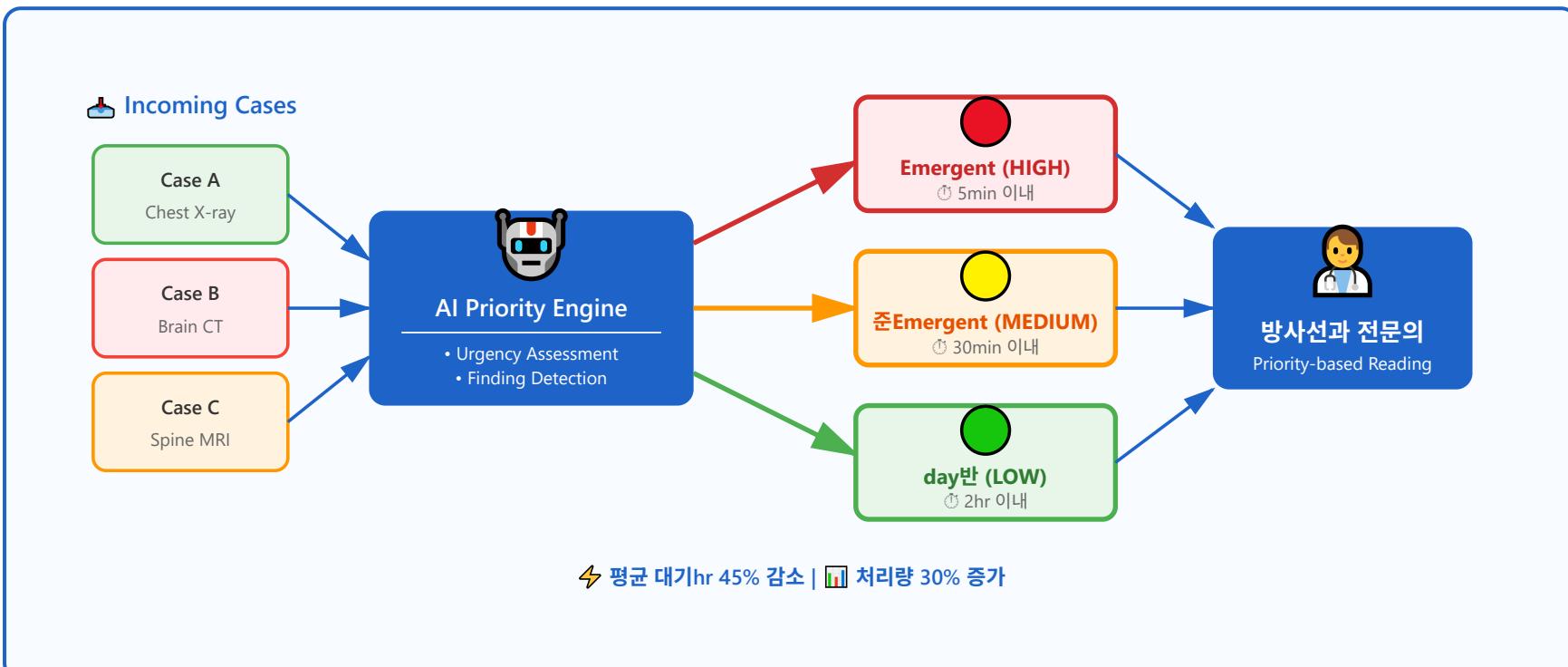


3sec

1000+

15+

# Priority Queuing (Priority Queuing)



Wait Time Reduction

**45%**

Throughput Increase

**30%**

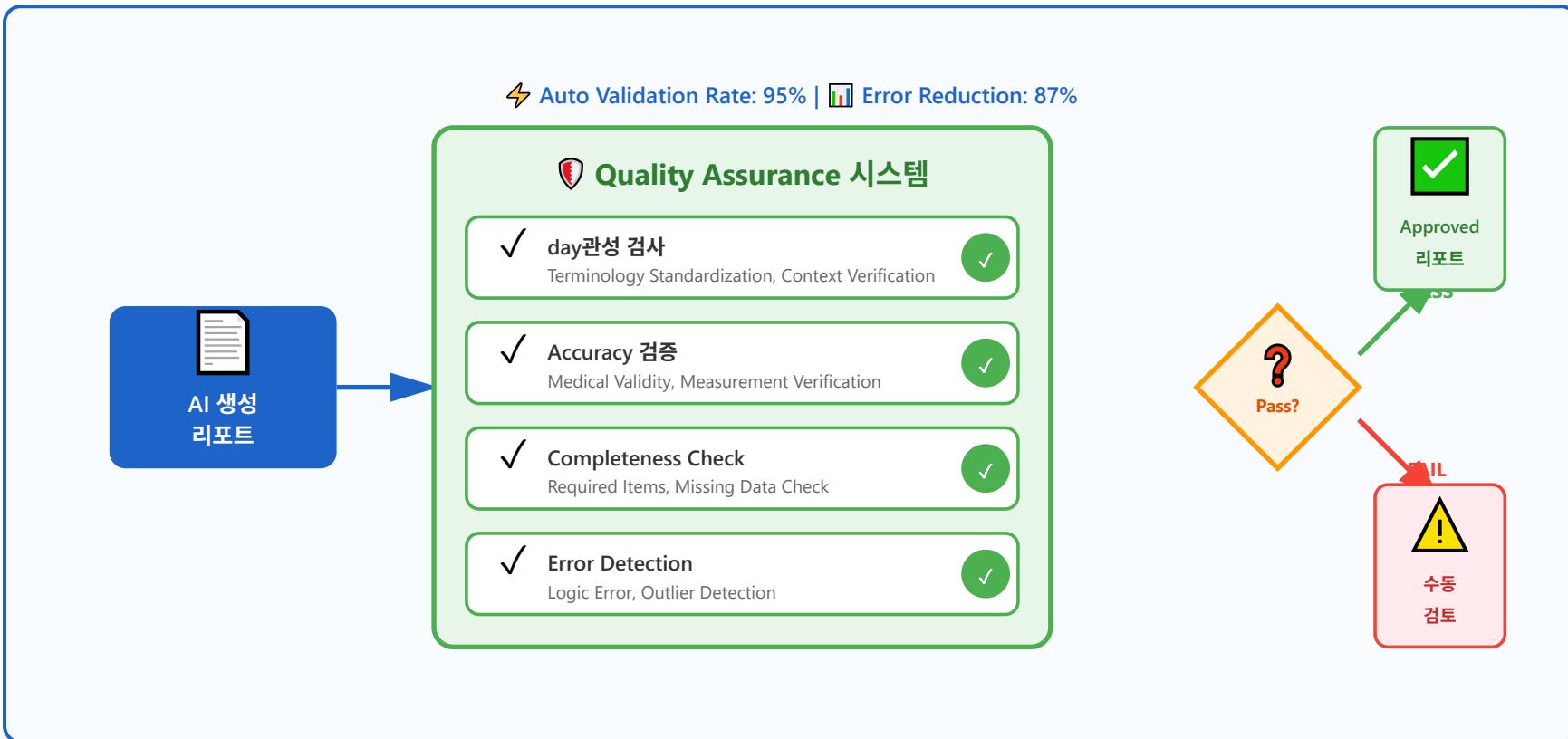
Urgent Case Processing

**98%**

시스템 Accuracy

**91%**

# Quality Assurance (Quality Assurance)



Auto Validation Rate

95%

Error Reduction

87%

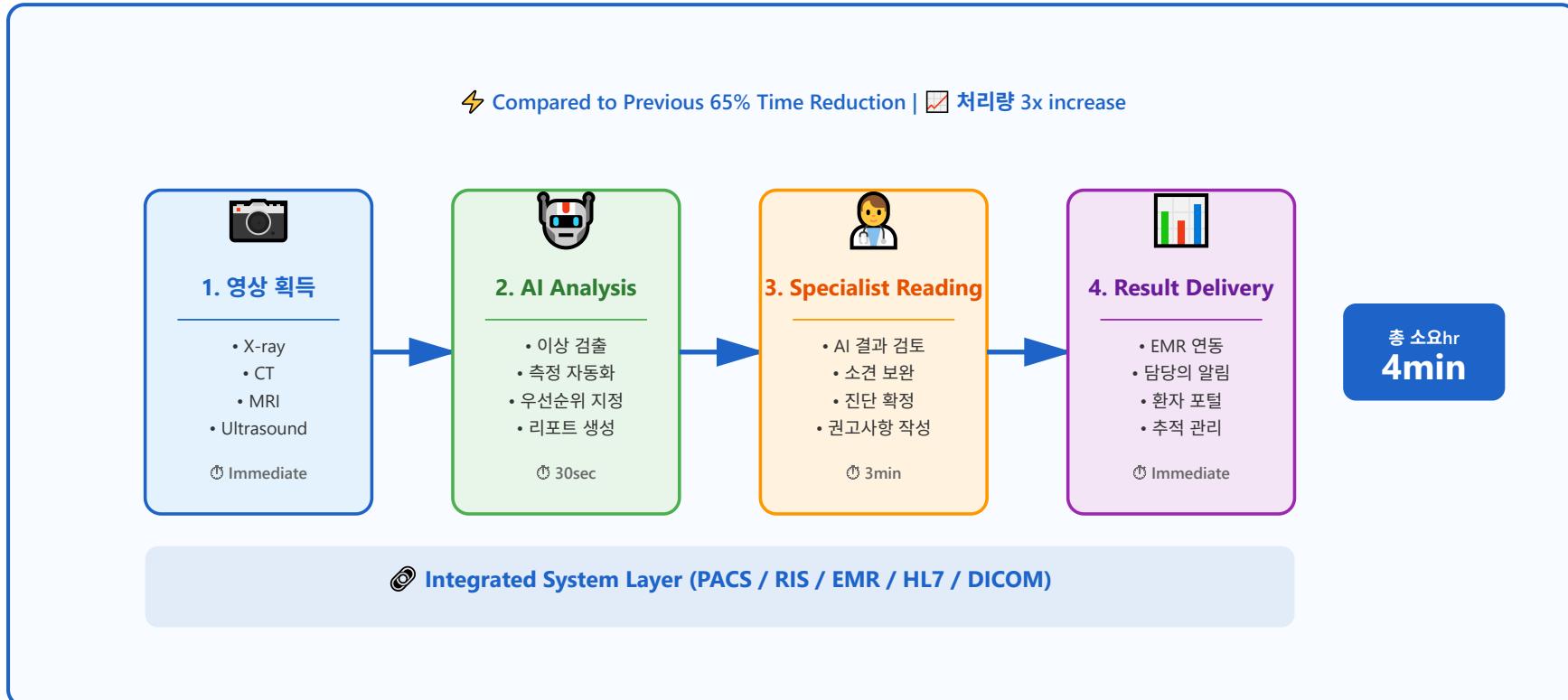
Processing Time

2sec

Manual Review Rate

5%

# Radiologist Workflow Integration



Physician Satisfaction

**92%**

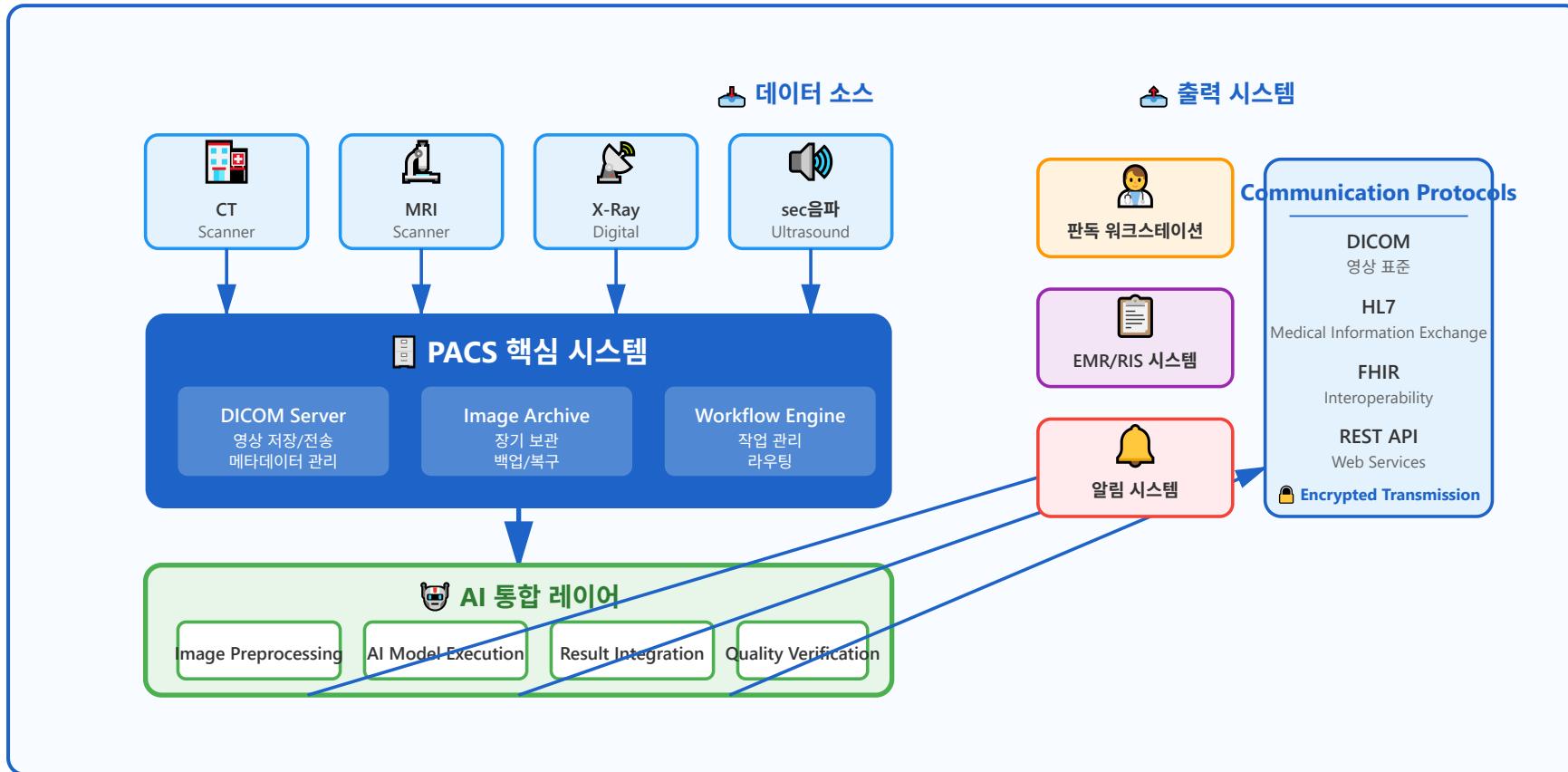
Misdiagnosis Reduction

**28%**

Cost Savings

**35%**

# PACS Integration (PACS Integration)

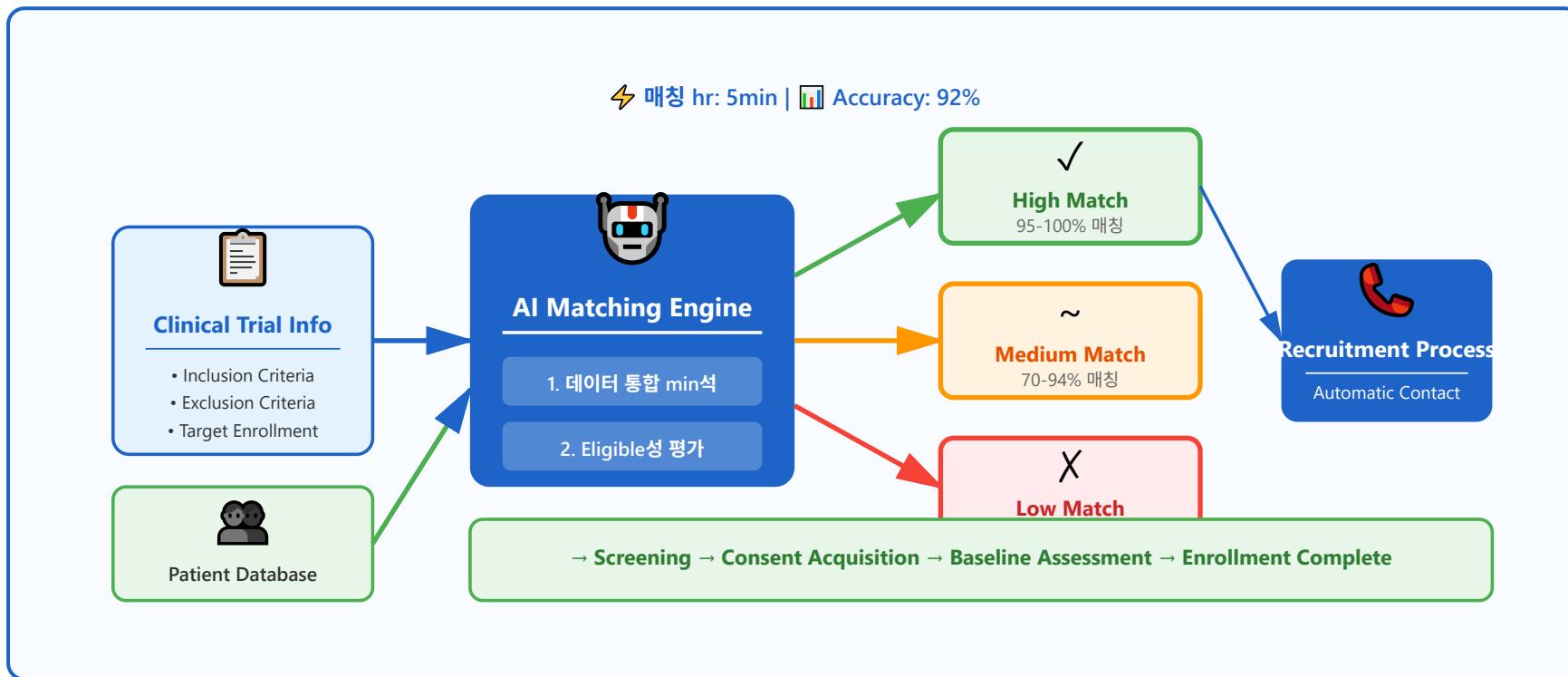


모바day 지원

**Part 3/3:**

# **Clinical Trials and Drug Discovery**

# Patient Matching (Patient Matching)



매칭 Accuracy

**92%**

Processing Time

**5min**

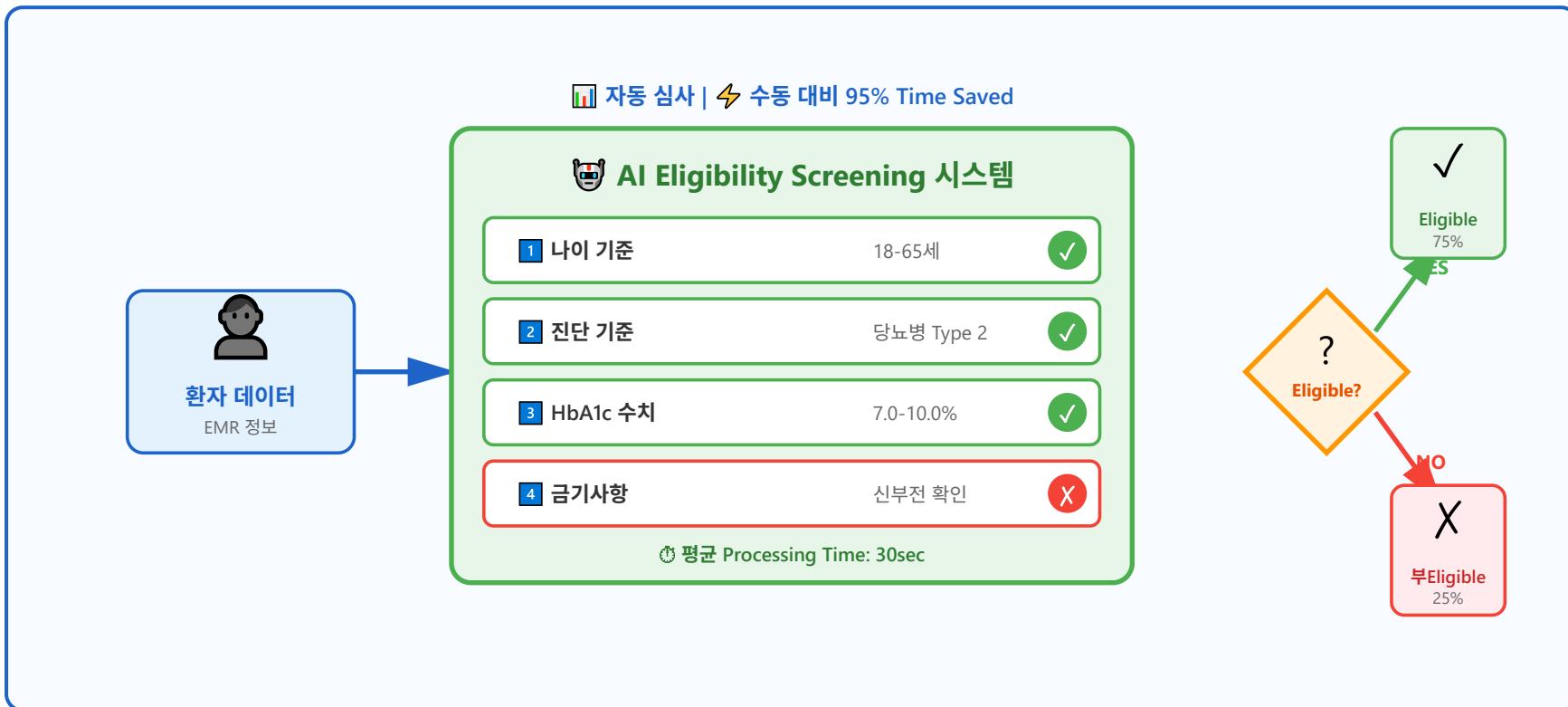
Recruitment Speed  
Improvement

**3배**

Cost Savings

**45%**

# Eligibility Screening (Eligibility Screening)



Processing Time

**30sec**

Accuracy

**96%**

Time Saved

**95%**

dayday 처리 건수

**500+**

# Protocol Optimization

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Adverse Event Monitoring

## Key Points

Feature 1

Feature 2

Feature 3

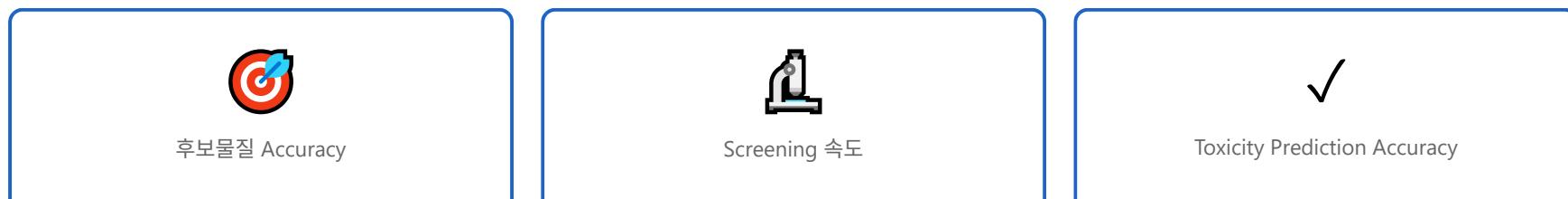
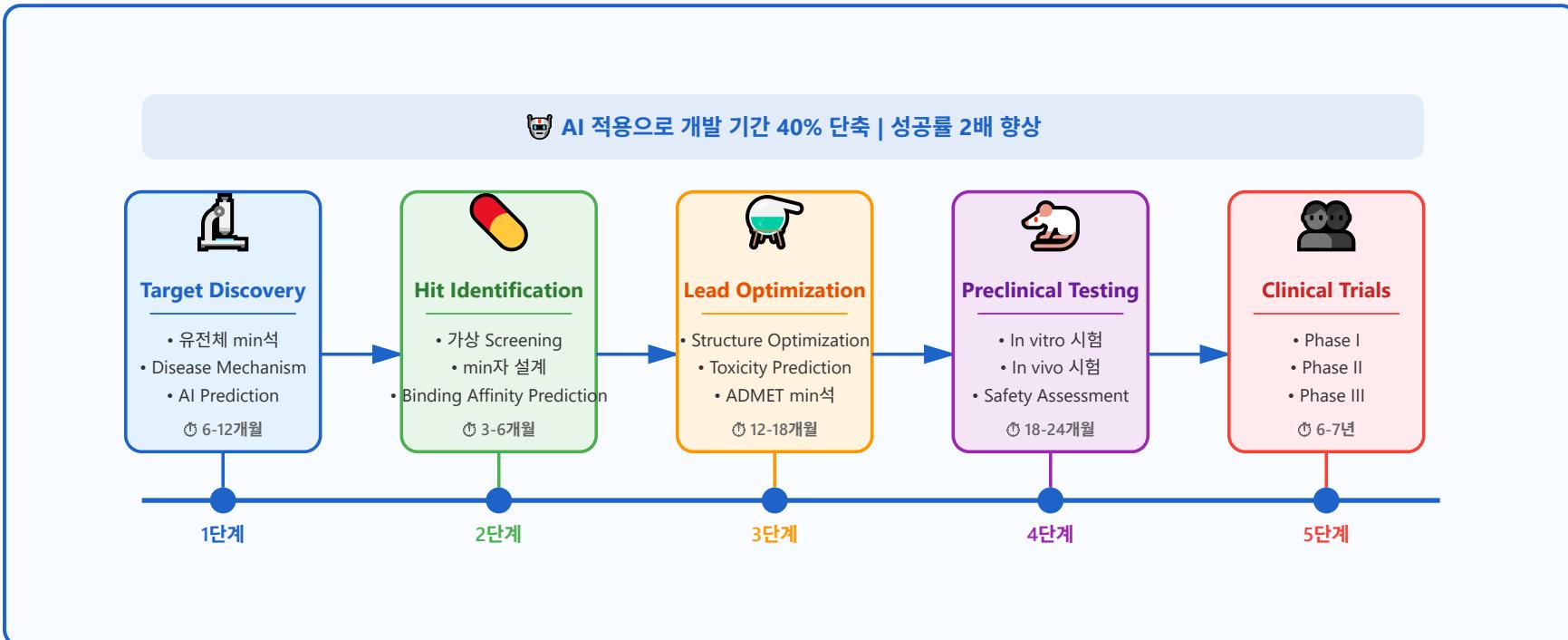
## Results

Result 1

Result 2

Result 3

# Drug Discovery Pipeline



85%

100배

90%

# Target Identification

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Population Health Management

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Risk Stratification

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Lessons Learned

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Success Factors

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Future Opportunities

## Key Points

Feature 1

Feature 2

Feature 3

## Results

Result 1

Result 2

Result 3

# Thank You

Real-World Case Studies in Medical AI