



MOLPAX BIO

AI diagnostics & therapeutics

New Opportunities for the Digital Transformation of Pathology Using synthetic data and genomic analysis

Applications ranging from drug development to disease diagnosis

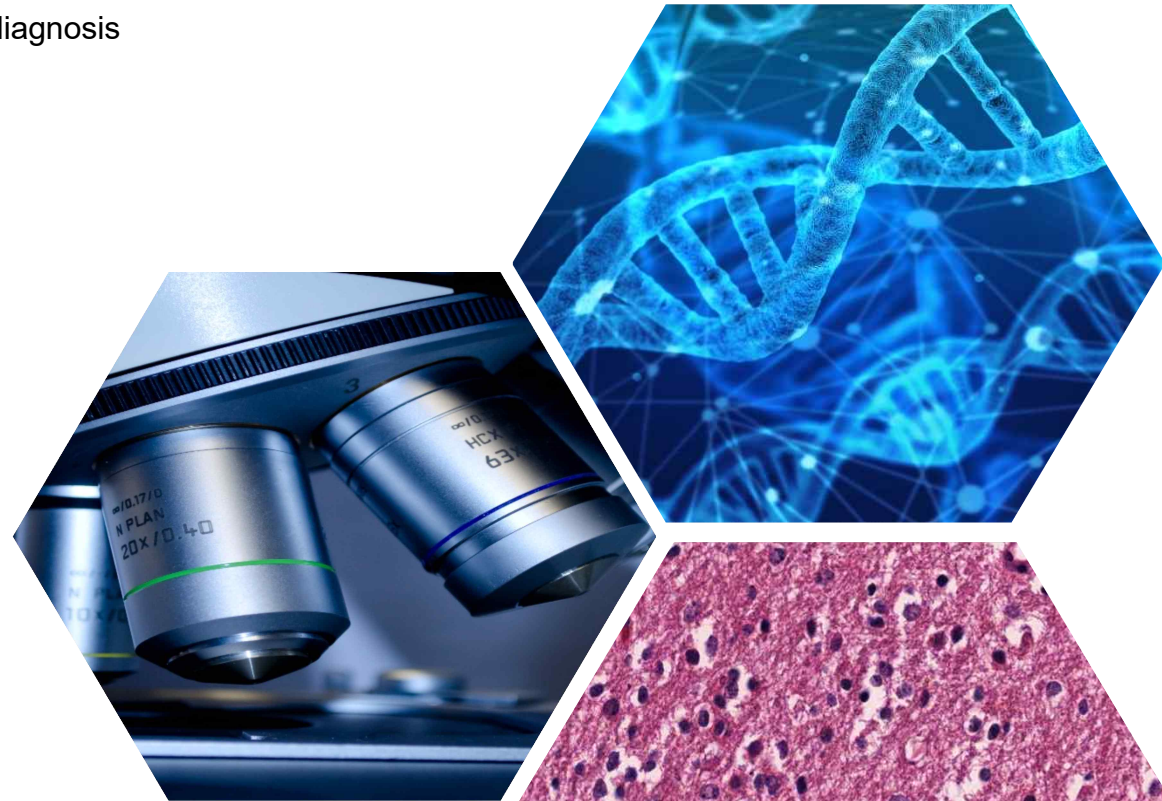


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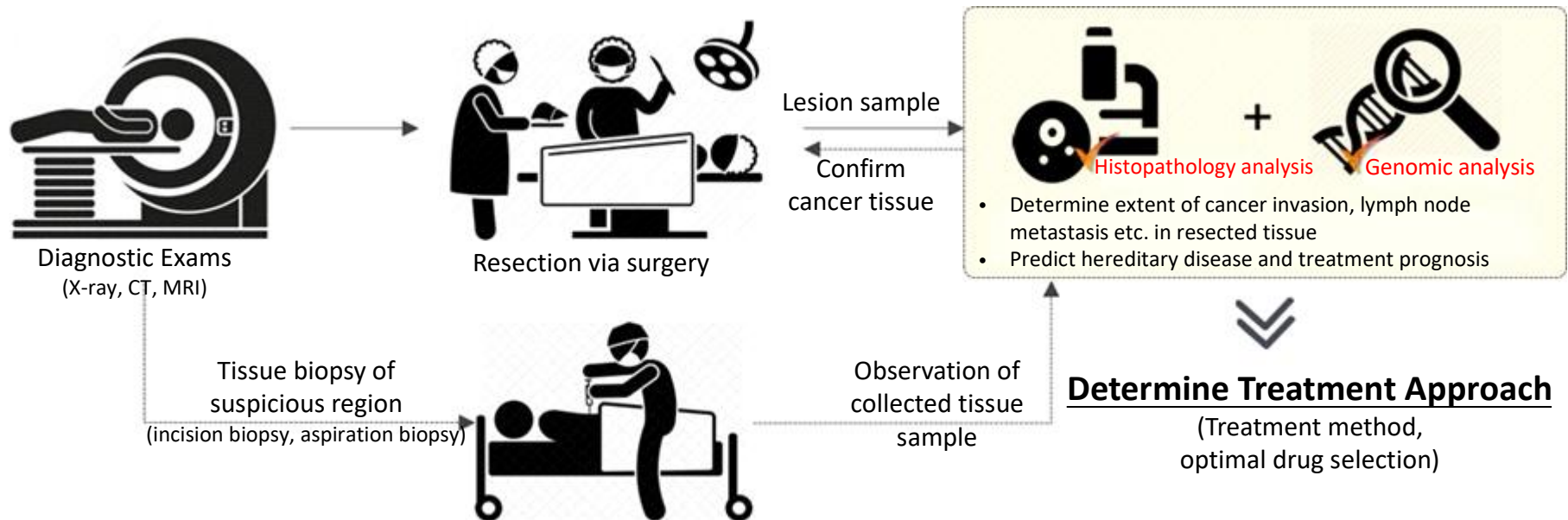
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- 2. Solution & Technology
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- 4. Current Status of AI Digital Pathology in South Korea
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1. Background

Current Pathology

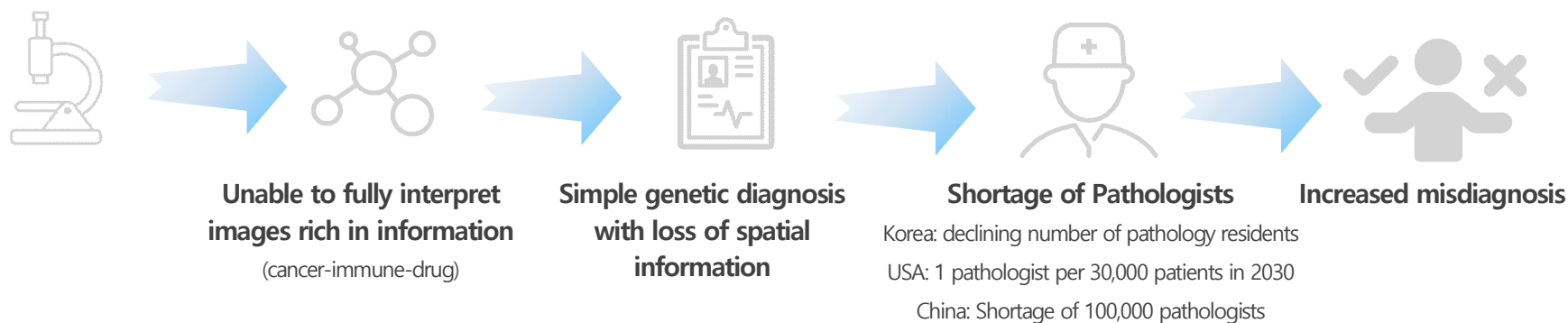
- Pathological biopsy refers to the stage of analyzing the degree of tissue invasion (stage classification) through classification of the lesion tissue after cancer surgery, and predicting the therapeutic effect of target drugs on genetic diseases through molecular pathology.
- The demand for pathological examination is increasing by 3-5% per year.





1. Limitations of Conventional Pathology

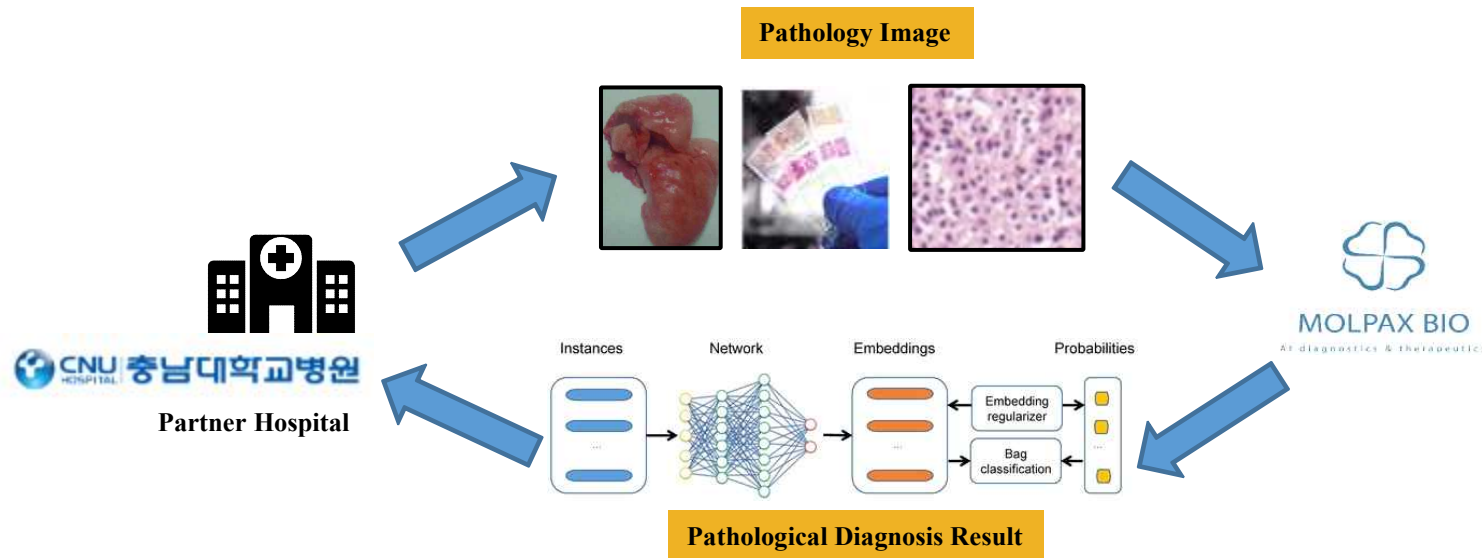
- Because tissue samples are judged by the naked eye, the consistency of microscopic findings is low.
- Recently released digital pathology solutions have been limited to scanning tissue samples and simple image classification. → so we will use **genomic analysis to extract more information from histopathology slides.**
- The demand for diagnosis is increasing, but the diagnosis is limited due to the lack of specialists in pathology. → so we will use **GAN synthetic data**
- ~~Because tissue samples are judged by the naked eye, the consistency of microscopic findings is low.~~
~~Recently released digital pathology solutions have been limited to scanning tissue samples and simple image classification.~~
~~→ so we will use genomic analysis to extract more information from histopathology slides.~~
~~The demand for diagnosis is increasing, but the diagnosis is limited due to the lack of specialists in pathology.~~
~~→ so we will use GAN synthetic data~~
such as deep learning are necessary.



2. Solution & Technology

Pathology data + Genetic data + Synthetic data

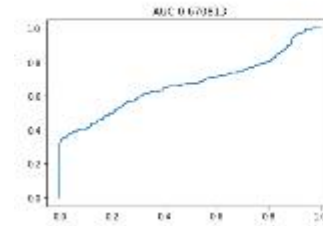
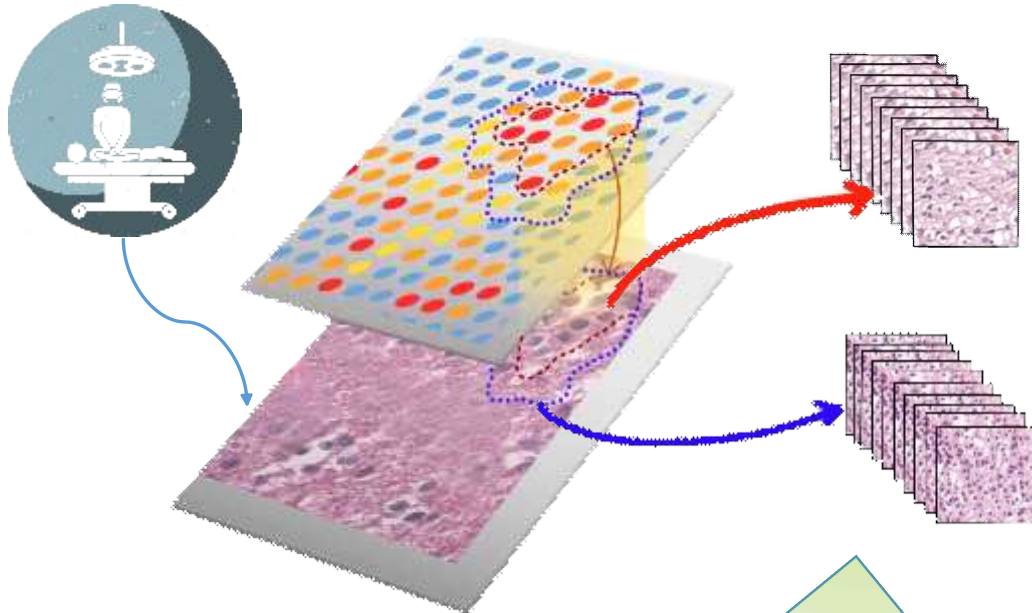
- We have secured clinical data through our partnership with Chungnam National University
- We are in cooperation with the Professor Jinman Kim's Team at Department of Pathology, who is providing us existing pathological slides or surgical tissue of cancer patients for us to analyze and scan.
- Chungnam National University Hospital currently has one large-capacity digital scanner, and an additional one will be implemented soon.



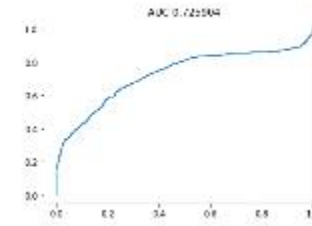


2. Solution & Technology

→ Use spatial genomic analysis to fine tune ROI for more accurate prediction.



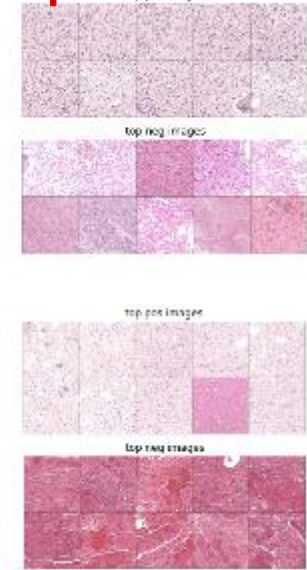
Position A: Accuracy 0.67



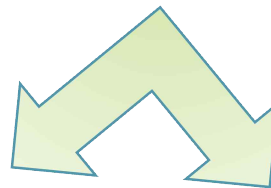
Position B: Accuracy 0.72

In-house performance testing results:

- miniscule differences in AOI
- may lead to different results



Improved performance by additionally utilizing cancer tissue genomic information



When creating composite images, performance may vary depending on location selection

Thus technology to select optimal location for genome analysis is necessary

AI pathology diagnostics



When using synthetic image generation technology, more accurate data can be generated by fusion of spatial genome analysis technology

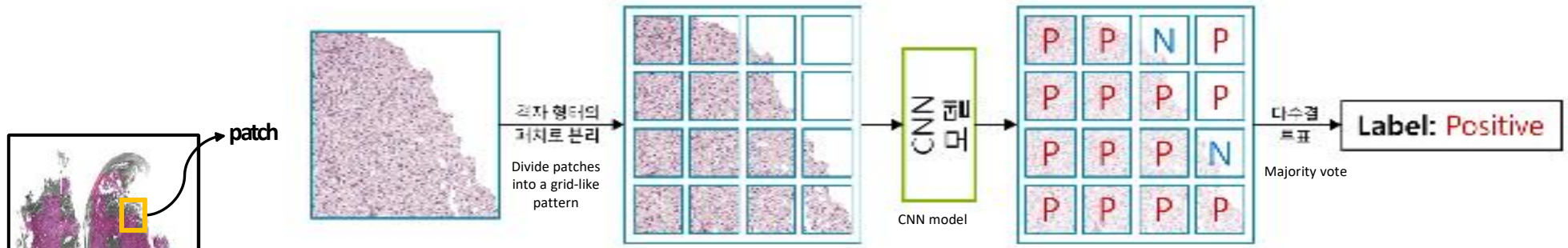


Quantitative measuring system to analyze drug response

Can assist CRO/ pharmaceutical companies by providing drug response prediction service during clinical trials.



2. Solution & Technology



Patient ID	Image	Ground Truth Label	Predicted Label
ZM19-001237	16614_16719_1423315_1.jpg	Negative	Negative
	15231_22209_1423980_2.jpg		Negative
ZM16-000429	11509_13976_1406813_1.jpg	Negative	Positive
	4621_30450_1405236_3.jpg		Negative
	14250_20846_1406695_3.jpg		Negative
	15607_34599_1405931_4.jpg		Negative
ZM18-000566	15545_15384_1420924_0.jpg	Positive	Positive
	8734_24858_1421688_2.jpg		Positive
	14287_34560_1420829_1.jpg		Negative
	8763_31812_1422129_2.jpg		Positive
	11457_23601_1421434_2.jpg		Positive

다수결 투표
Majority vote

Patient ID	Image	Ground Truth Label	Predicted Label
ZM19-001237	16614_16719_1423315_1.jpg	Negative	Negative
	15231_22209_1423980_2.jpg		Negative
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	4621_30450_1405236_3.jpg		Negative
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	15607_34599_1405931_4.jpg		Negative
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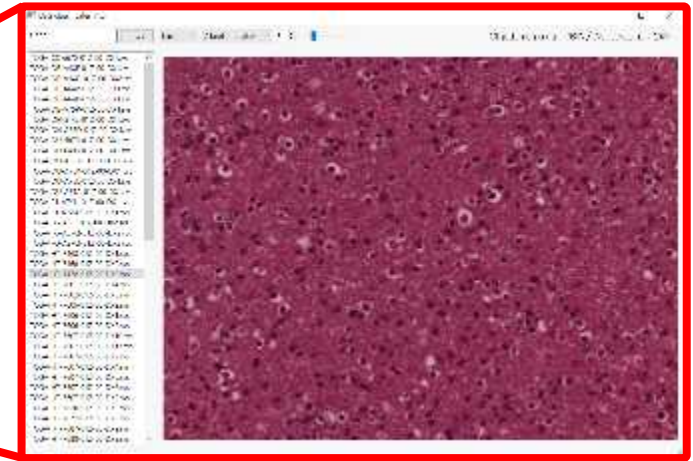
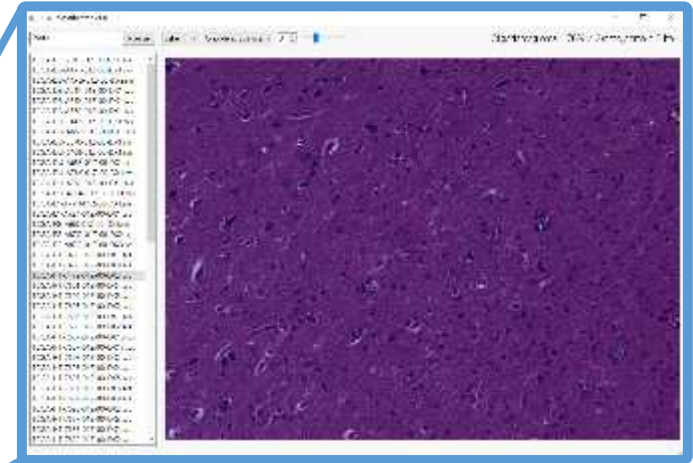
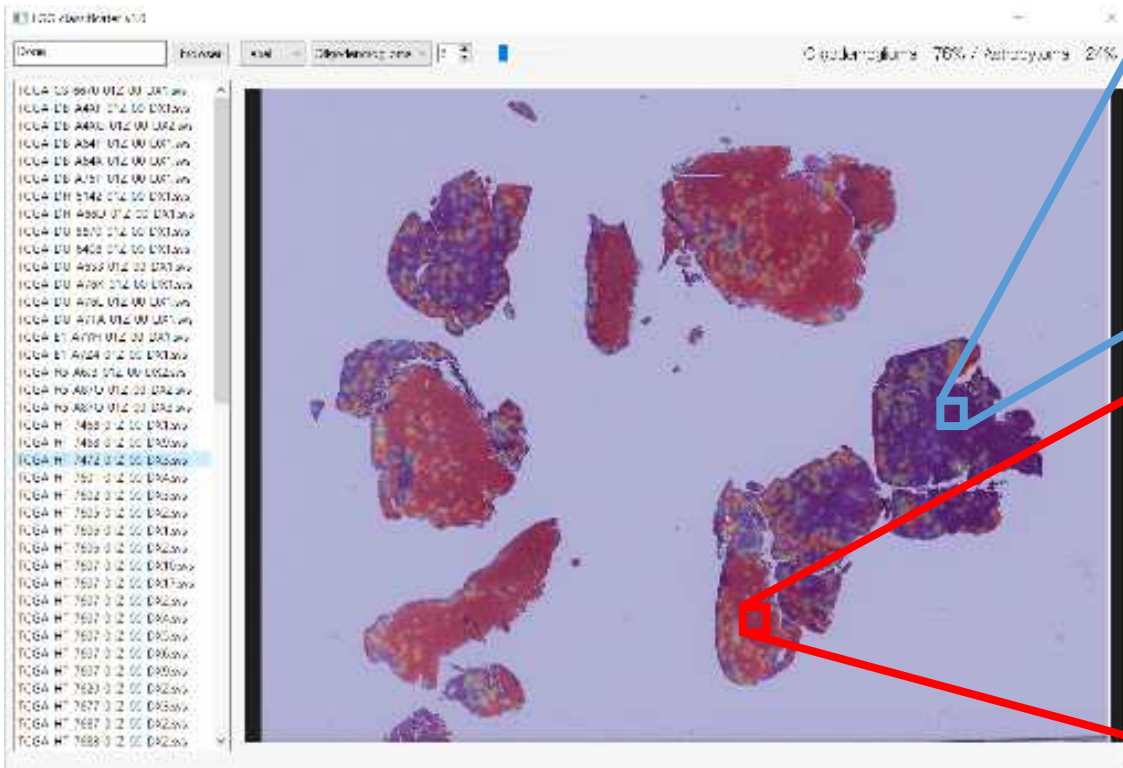
Positive/negative scoring for each patch



2. Algorithm Models in Development

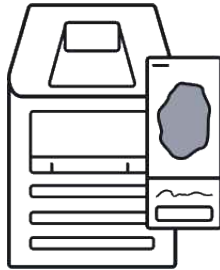
Diagnostic Area Visualization Software

- Diagnosis name designation function
- Scale adjustment function
- Opacity control function





3. Business Plan



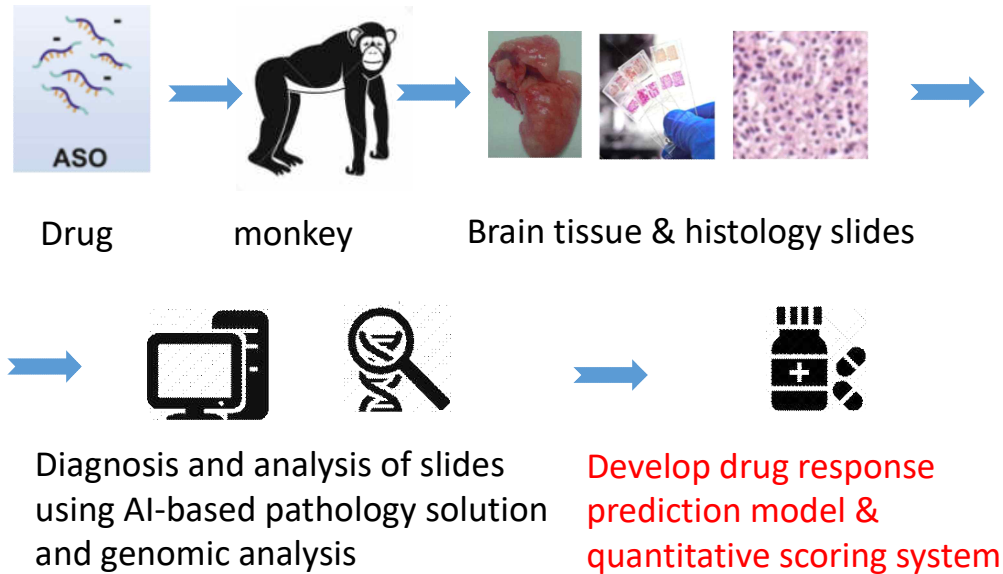
- In the process of collaborating with a company to build a **compact portable pathology slide scanner**
- We will be providing AI pathology software
- Goal: OEM



Digital scanner



- Collaborating with KAIST
- Participating in **animal testing** for AI-based drug discovery using pathology diagnostic algorithms





4. Current Status of AI Digital Pathology in South Korea

Korean and European Digital Pathology Project started this year - 2021

Korean Ministry of Health and Welfare started **BIGPICTURE**,
an AI digital pathology joint project with numerous European companies.

South Korea



보건복지부 **KKIDI** 한국보건산업진흥원

Name of Project	Budget and Duration
Development of AI based digital pathology solution for cancer	43 Billion won/ 5 years (2021 ~ 2025)
Synthetic medical data generation and Clinical Trials	4.5 Billion won / 3 years (2021 ~ 2023)

Europe



we are BIGPICTURE
European Digital Pathology Platform

imi
Innovative Medicine Initiative

Started a project to digitalize 3 million patient and animal tissue images (2021 ~ 2027) with the cooperation of many pharmaceutical companies.
<https://www.imi.europa.eu/projects-results/project-factsheets/bigpicture>

Growing global interest and expectations for digital pathology

Pharmaceutical companies are interested in the possibility of discovery of biomarkers by analyzing cancer tissue images with artificial intelligence.



4. Current Status of AI Digital Pathology in South Korea

- Currently, 58 AI software products have been approved by the Ministry of Food and Drug Safety
- Among them, two products use pathological images
- However, all products **use needle biopsies rather than surgically resected tissues**

Size of the Korean Digital Histopathology Market

Number of patients
4,300,000

Cost of diagnostic tests
201 billion Won

국내 인공지능·빅데이터 기반 독립형소프트웨어의료기기 허가 사례

순번	항목명 (종류)	허가번호	모델명 / 세부명	유형명	사용목적	의뢰
1	의료영상인식 소프트웨어 (제1)	제허 19-080 호	MCA, DCN의 2건 / Lunit INSIGHT CXR, MRI	코인	흉부 방사선학 (X-ray) 영상이에서 이상부위를 검출하여 진단의뢰 신청대상은 보조하는 소프트웨어 (소프트웨어)	
2	의료영상분석 소프트웨어 (제1)	제허 19-085 호	JFD-01A	폐암용례의 인식대상	의료영상물 획득하여 보조 진단, 코인, 진단에 사용 가능. 영구적 분석하는 영상이에 적용하는 소프트웨어 (의뢰 대상 영상 분석)	
3	의료영상인식 소프트웨어 (제1)	제허 19-082 호	JFD-02A	폐암용례의 인식대상	의료영상물 획득하여 보조 진단, 코인, 진단에 사용 가능. 영구적 분석하는 영상이에 적용하는 소프트웨어 (의뢰 대상 영상 분석)	
4	의료영상인식 소프트웨어 (제1)	제허 19-082 호	JFD-01A	폐암용례의 인식대상	의료영상물 획득하여 보조 진단, 코인, 진단에 사용 가능. 영구적 분석하는 영상이에 적용하는 소프트웨어 (의뢰 대상 영상 분석)	
5	의료영상인식 소프트웨어 (제1)	제허 19-080 호	DS-01-01 / DHP-01-01-01	일본어	시술에 이후 비선형성 (X-ray) 영상에서 이후 분석결과도 포함되는 이상부위를 검출하여 의뢰인의 진단결과를 보조하는 소프트웨어 (소프트웨어)	
6	의료영상인식 소프트웨어 (제1)	제허 19-051 호	WN-M-02 / WUNO Med Chest X-ray	특	흉부 X-ray 영상이에서 이상부위를 검출하여 의뢰인 및 의뢰인 등으로 표시하여 의사 및 의뢰인 보조하기 위한 목적의 소프트웨어	

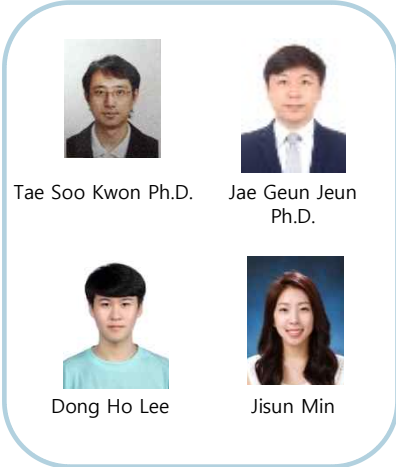
순번	종류명 (종류)	허가번호	모델명 / 세부명	입사명	사용목적	의뢰
7	의료영상인식 소프트웨어 (제1)	제허 19-065 호	JAE-01K	제1업체인 인식대상	의료영상(제1)에서 이상을 획득하여 보조 진단, 코인, 진단에 사용 가능. 영구적 분석하는 영상이에 적용하는 소프트웨어 (소프트웨어)	
8	의료영상인식 소프트웨어 (제1)	제허 19-090 호	MMO-EU의 3건 / Lunit INSIGHT MRI	코인	관상동맥의 경우 0.5mm 해상도에서 관상동맥의 이상 부위를 검출하여 의뢰인에게 의뢰하는 영상 분석을 보조하는 영상 영상이에 사용 가능. 영구적 분석하는 영상이에 적용하는 소프트웨어 (소프트웨어)	
9	의료영상인식 소프트웨어 (제1)	제허 19-057 호	Lung Nodule Detection	제1업체인	흉부 (X-ray) 영상이에 이상부위를 검출하여 의뢰인에게 의뢰하여 의뢰인의 진단 결과를 보조하는 소프트웨어 (소프트웨어)	
10	의료영상인식 소프트웨어 (제1)	제허 19-069 호	Carbino / Carbino	(주)카리노 나미	의료용 영상물 저장, 확대, 축소, 조광에 관계 없이, 영구적으로 영상이에 저장하고 영상이에 사용되는 소프트웨어	
11	의료영상인식 소프트웨어 (제1)	제허 19-074 호	NDL-DCM2 121 / Lunit INSIGHT CXR, Nodule	코인	흉부 방사선학 (X-ray) 영상이에서 이상부위를 검출하여 의뢰인에게 의뢰하는 영상 분석을 보조하는 소프트웨어 (소프트웨어)	
12	의료영상인식 소프트웨어 (제1)	제허 19-072 호	JES-01K / JES-01K	제1업체인 인식대상	환자의 MRI (Magnetic Resonance) 영상에서 이상 부위를 검출하여 의뢰인에게 의뢰하는 영상 분석을 보조하는 소프트웨어 (소프트웨어)	
13	의료영상인식 소프트웨어 (제1)	제허 19-060 호	WN-M-01 / WUNO Mod BoneAge	주노웨이 베노	Could-Pic (IGF) 영상의 골연령 검출을 기반으로 환자의 실제 나이 X-ray 영상이에 대한 골연령 분석하여 의뢰인에게 환자의 골연령을 안내하는 것을 지원하는 소프트웨어 (소프트웨어)	

Our Team

CEO



Biomedical Team



AI Engineering Team



Our Office

Daejeon, South Korea

Tel: +82 070 4193 8502
Fax: +82 0303 3444 8809

