Cerebral Infarction AI

Prediction of hemorrhagic transformation during the administration of anticoagulants to stroke patients

November 2023

3KBICAS

Critical Challenges in Cerebrovascular Accidents (CVA):

Urgency in Decision-Making, Thrombolytic Risks, and the Impact of Specialist Deficiency

A staggering 85% of cerebrovascular accidents (CVA) manifest as "Ischemic Stroke," demanding urgent decisions from medical professionals to accurately predict the potential transformation into a "Hemorrhagic Stroke." (4.5-hour golden time)

85%

Ischemic Stroke
Cerebral Infarction
(blood vessel blocked)

↓

Use **thrombolytic drugs** to dissolve clotted blood or **surgery**

15%

Hemorrhagic Stroke
Cerebral Hemorrhage
(blood vessel busted)

↓

Use **medication** to lower the cerebral/blood pressure or **surgery**

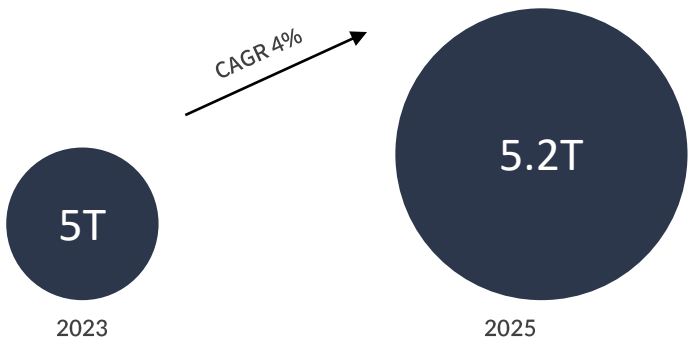
- Urgent Decision-Making: **High mortality rate**, highlighting the need for **robust, immediate, and accessible** solutions
- Thrombolytic Risk: **20% of patients on thrombolytic drugs** face potential **hemorrhagic stroke**.
- Specialist Deficiency: **Lack of specialists** in emergency rooms or rural areas increases patient **vulnerability**.

Source: Ministry of Health and Welfare

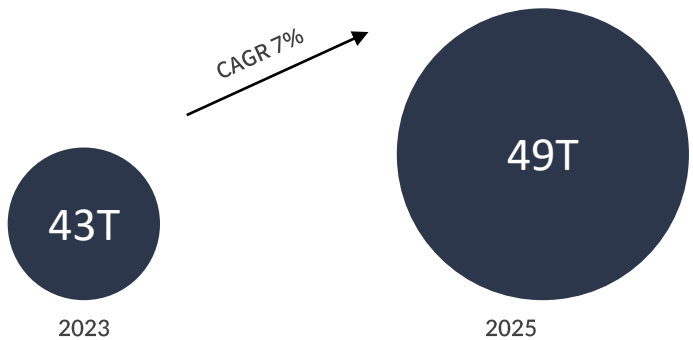
Market size

Rapid growth of the AI medical market and steady occurrence of cerebrovascular disease (stroke)

Korea



Global

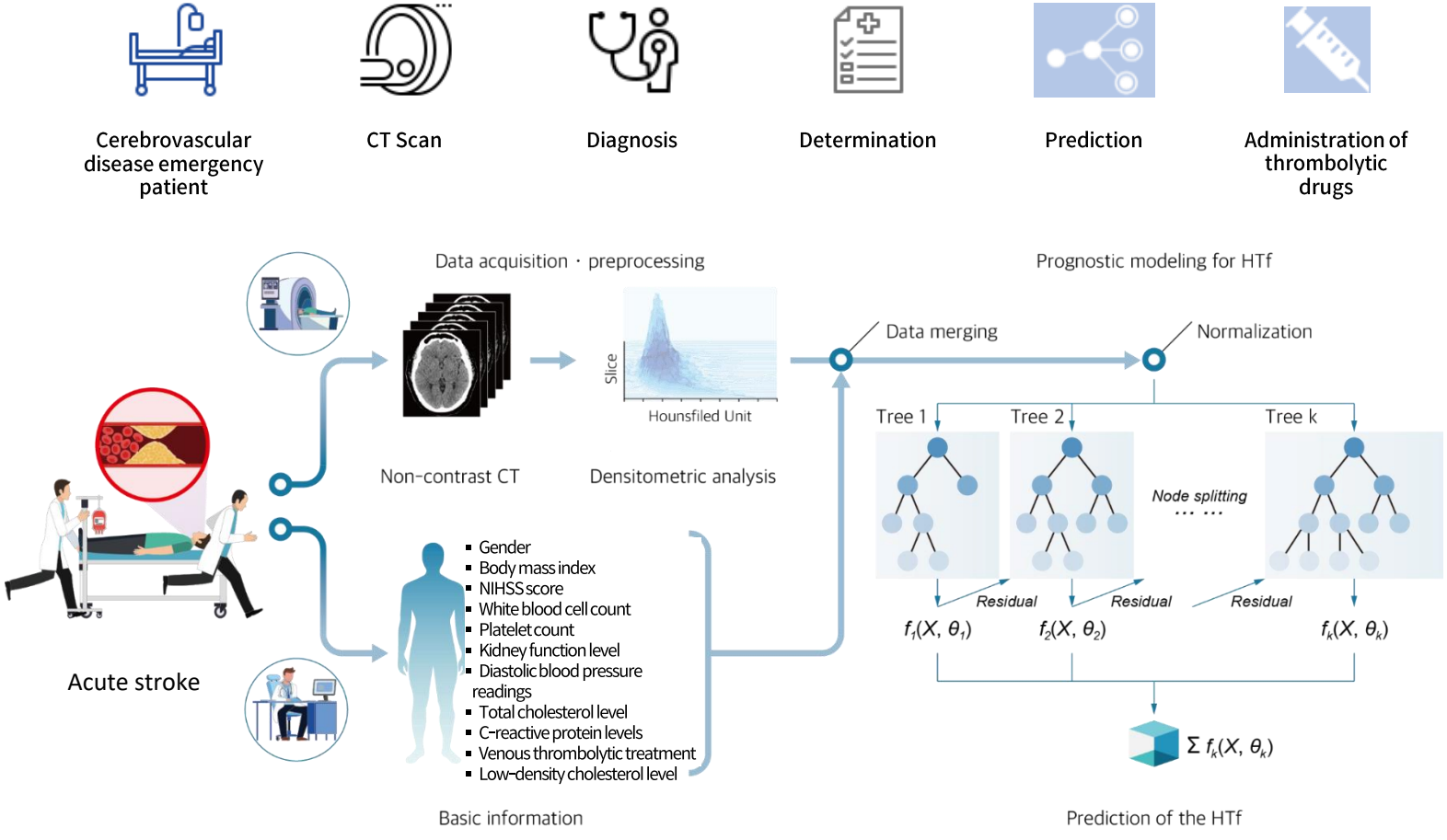


Source: Ministry of Health and Welfare

Solution

MAPIS: Medical AI Prediction Image System

Machine learning framework that can predict hemorrhagic transformation with high confidence after thrombolytics administration based on quantitative analysis of emergency CT and patient basic clinical information



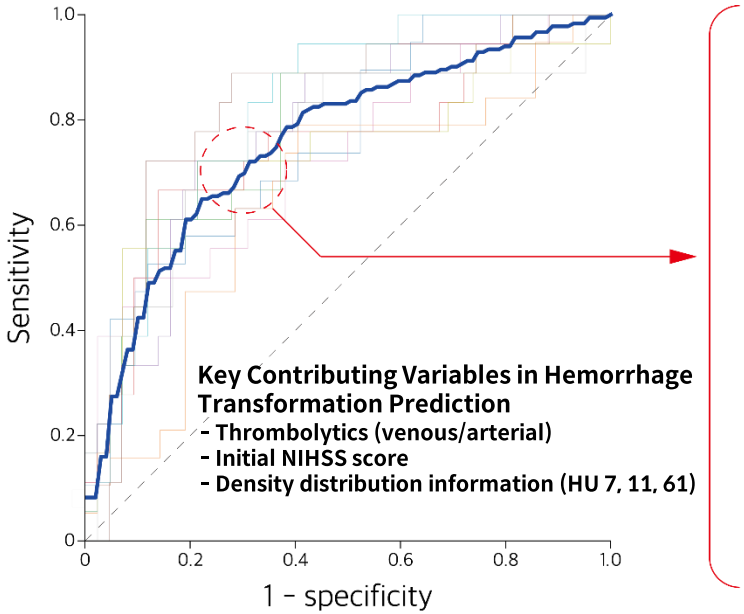
Source: Ministry of Health and Welfare

Solution

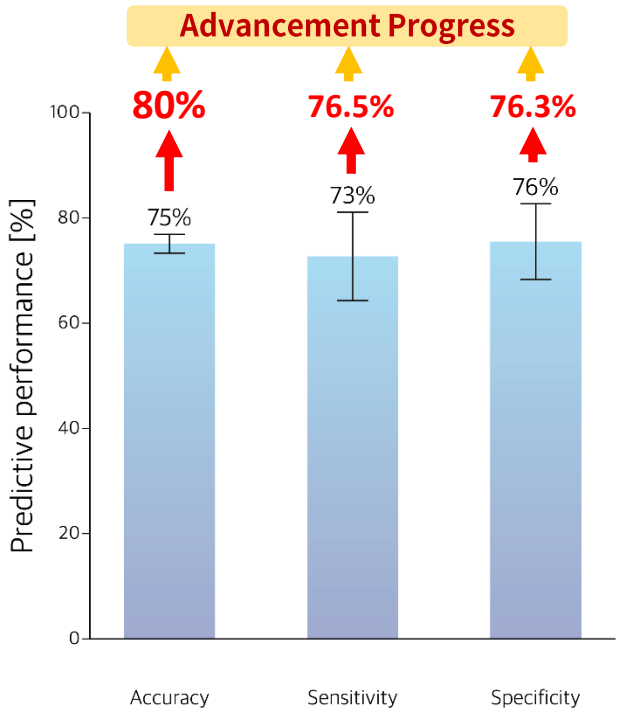
MAPIS: Medical AI Prediction Image System

Used MAPIS for 1,275 patients > Achieved 80%+ accuracy with only non-contrast CT images for the first time in the world.

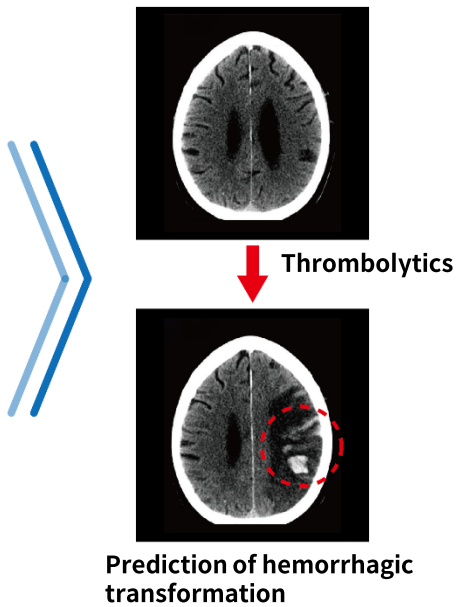
- Achieved 75% accuracy with the first clinical data of 606 people
- Achieved 80% accuracy by applying clinical data of 1,275 people and strengthening the deep learning algorithm
- Continued efforts such as securing additional clinical data and correcting images using the imaging equipment (CT) Head Phantom Upgrading in progress



Hemorrhagic Transformation Prediction ROC Curve



Hemorrhagic Transformation Prediction Accuracy



Hemorrhagic Transformation Prediction Case

Our competitive advantages

Unlike cerebral hemorrhage diagnosis technologies, MAPIS is a “golden time saver” that helps make a quick decision on whether to administer thrombolytics.

KOREA	3KBICAS	SK C&C	Heuron	VUNO	JLK	Lunit
Business model	Cerebral infarction disease Medical AI Solution	IT Service Solutions by Industry	Cranial nerve disease AI solution	Medical AI Solution	Medical AI Solution	Diagnosis and prediction based on medical imaging analysis
Brain-related main business	Hemorrhagic transformation prediction service for patients with cerebral infarction ※CDSS : Present treatment guidelines	Cerebral hemorrhage readings	Cranial nerve disease (Dementia, Parkinson's, Stroke) Providing analysis data necessary for the determination of cerebral infarction by CT image	Assisting in diagnosing degenerative brain diseases by quantifying the degree of brain atrophy	Stroke diagnosis, severity prediction and stroke area segmentation	Not applicable
Establishment date / Scale of investment	November 2018	Not applicable	2017 / Pre-IPO (2021: 34Bn+)	2014 / IPO (2021: 59Bn+)	2014 / IPO (2019: 54Bn)	2013 / IPO (2022: 196Bn+)

GLOBAL	Viz	NovaSignal	Zeit Medical	RapidAI	Caption Health
Business model	Deriving health singularities through brain scan using machine learning / Detecting suspected signs of cerebrovascular and stroke through deep learning algorithms and notifying the attending physician	Using ultrasound, robotics, and AI technology from various angles, it provides more accurate diagnosis of real-time cerebrovascular blood circulation in a non-surgical manner	Through the head band equipped with ultrasonic technology, emergency situations such as cerebral hemorrhage and stroke are transmitted to smartphones and emergency medical institutions during daily life and sleep	Using AI platforms to improve the speed and accuracy of diagnosis and treatment of cerebral hemorrhage and aneurysms	Automate early screening and diagnosis through ultrasonic solutions based on AI platform

Management

Dr. Sanghyung Lee

Chief Medical Officer

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- Computer Officer, Army Military Investigation
- Hongik University Computer Science

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Chief Marketing Officer

- Vice President at 3K Soft
- CEO of Geo
- Hallym University

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Dean

- Dean of Hallym University College of Medicine
- PhD from Texas State University, USA
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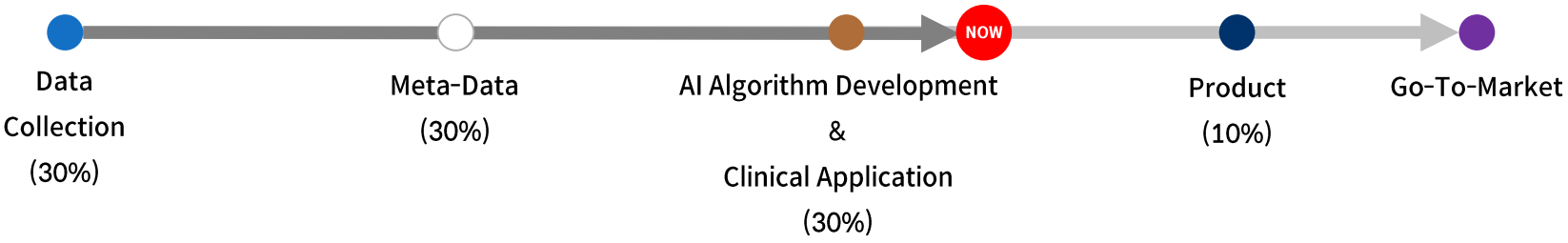
- Adjunct Professor of Neurology and Artificial Intelligence Studies

Jun-ho Jeong

- Kyung Hee University Graduate School of Journalism and Information Studies, Cultural Contents & Department of Theater and Film
- Jeonju International Film Festival Executive Committee Chairman
- CEO of Benzef Golf
- 2021 World Star Entertainment Awards Movie Actor Category Grand Prize

Development Roadmap

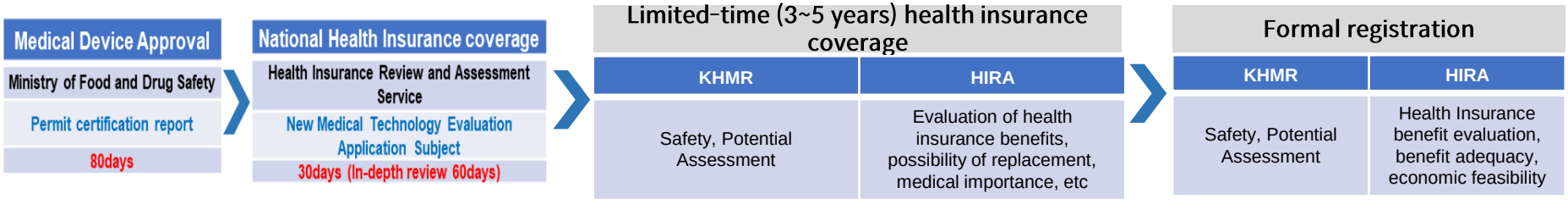


	2023												2024											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Development of cerebral infarction prediction algorithm																								
MAPIS Solution Development																								
Registration of innovative medical technology																								
> Initiate exploratory clinical trials																								
> Ministry of Food and Drug Safety approval for exploratory clinical trials																								
> Ministry of Food and Drug Safety report and final approval review																								
Schedule when applying for integrated review of innovative medical devices																								
> Application for integrated review by the Ministry of Food and Drug Safety																								
> Application for evaluation of innovative medical technology by KHMR															Shorten by 8 months									

Certification Roadmap

'MAPIS' is an AI-based medical image information analysis and prediction solution, which corresponds to innovative medical devices in accordance with the Special Regulations on Innovative Medical Device Approval (Notification No. 2021-15), and belongs to the medical software MFDS review priority items, and is subject to the integrated review of innovative medical technology and innovative medical devices(Related laws: Medical Device Industry Promotion and Innovative Medical Device Support Act, Enforcement Decree and Rules on Support and Management of Innovative Medical Devices, etc.)

Innovative medical technology registration process (120 days + α)



Integrated Review Process for Innovative Medical Devices (30 days + α)

※ Product sales / 2nd clinical trial (medical fees applied) concurrently

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※ MFDS : Ministry of Food and Drug Safety
※ KHMR : Korea Health and Medical Research Institute
※ HIRA : Health Insurance Review and Assessment Service
※ KHIDI : Korea Health Industry Development Institute

Sales Roadmap

Domestic

	Construction stage	Remarks	Note
2024	Phase of building a pilot package system	**Building a pilot package system for Hallym University affiliated hospitals (6 locations)**	➢Annual MRI scans for brain disorders patients: 5.3 million ➢Analysis cost by MRI/CT specialists: 1,810 KRW ($1.2) per scan ➢JLK Corp has implemented its brain infarction diagnosis (MRI) solution as of November 2023 for 200 tertiary general hospitals. - Examination cost is set at $54,300 per scan. - Expected annual revenue is over **$120 billion**
2025	**Initial deployment, dissemination phase**	- **Package System :** Nationwide Tertiary(45),General Hospitals(438) / 200 locations - **Cloud System (SaaS) :** Nationwide Small and medium-sized hospital(1,515) / 100 locations	
2026	**Nationwide spread dissemination phase**	- **Package System :** Nationwide Tertiary(45),General Hospitals(438) / 350 locations - **Cloud System (SaaS) :** Nationwide Small and medium-sized hospital(1,515) / 1,000 locations	

Global

Expected sales of KRW 128Bn with a 5% share of 17,000 general hospitals in a country with a large cerebral hemorrhage market and openness to new technology introduction.

1st priority
USA, Canada, Japan, China

2nd priority
Germany, Italy, England, France, India

16,993 General Hospitals
- USA: 5,815
- Canada: 1,200
- Japan: 1,546
- China: 8,432

USA

- 42% of the global medical device market, $530 billion in socioeconomic losses due to strokes, and a $3,600 billion market for stroke-related medical care.
- Viz AI's revenue for 2023 1Q is $850 million.

Source: **Health Insurance Review and Assessment Service 'Statistical Analysis of Health and Medical Resources (2016~2020)'**
American Hospital Association, Ministry of Health, Labor and Welfare of Japan, Health Canada of Canada, National Health Commission of China