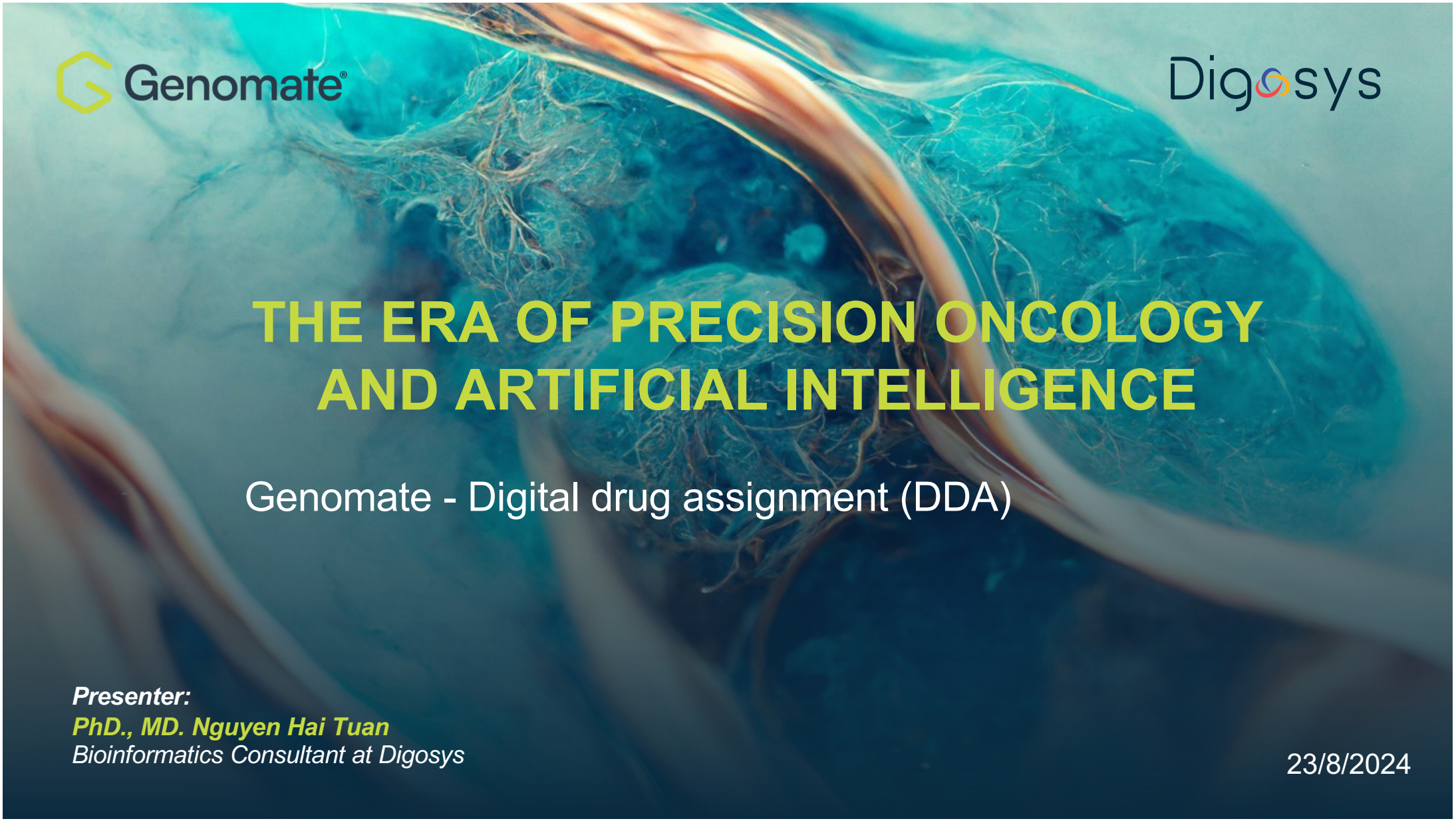
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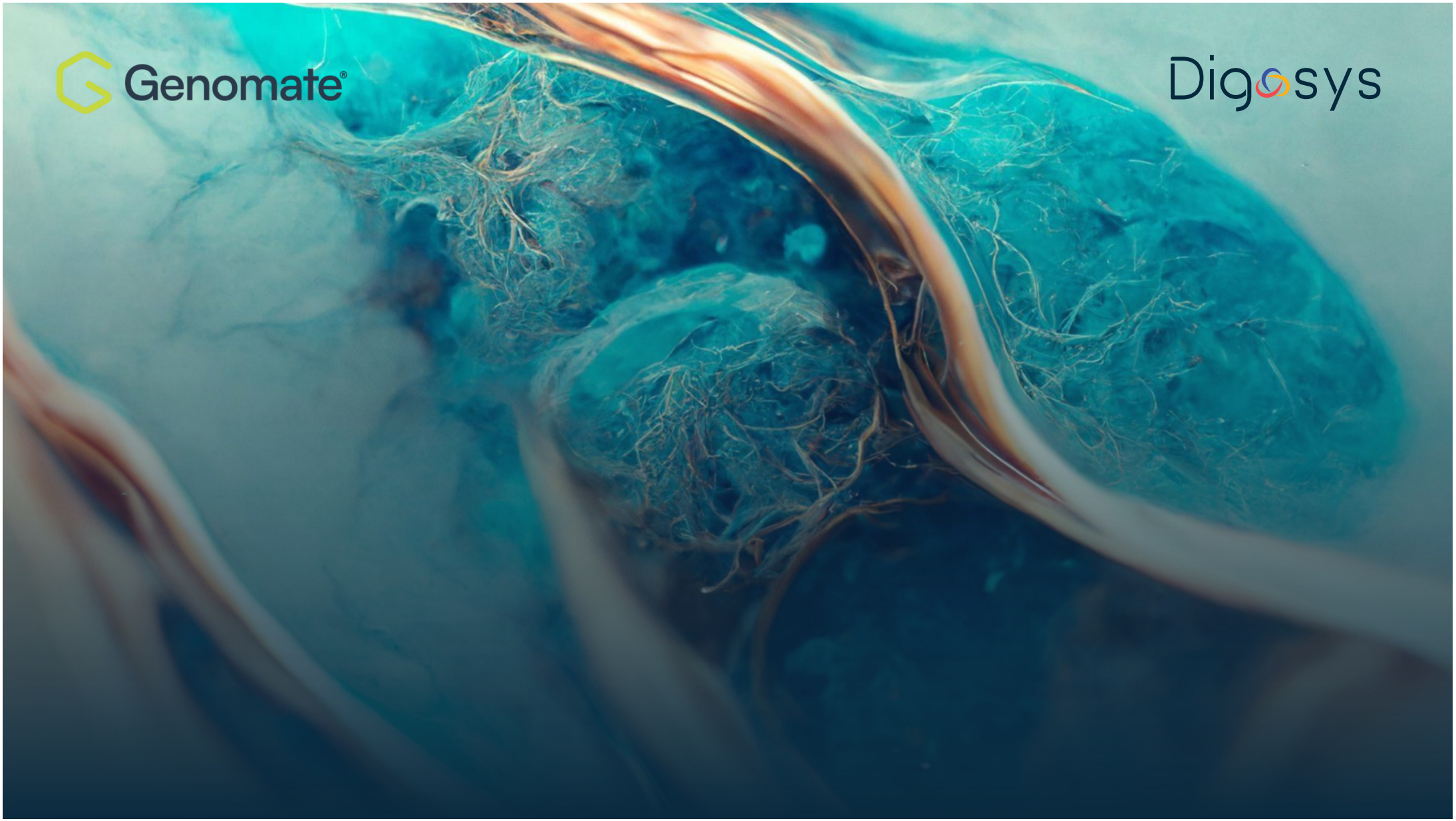
THE ERA OF PRECISION ONCOLOGY
AND ARTIFICIAL INTELLIGENCE
Genomate - Digital drug assignment (DDA)
Presenter:
PhD., MD. Nguyen Hai Tuan
Bioinformatics Consultant at Digosys
23/8/2024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# Outline:

1. The cancer landscape in Vietnam (current and future outlook)
2. Limitations and challenges in cancer diagnosis and treatment in Vietnam
3. Global trends and new treatment models (precision oncology)
4. The necessity of clinical decision support systems (general)
5. Genomate Solution – Digital drug assignment (DDA),
6. Breakthrough significance and achievements of Genomate
7. Genous™ services (Large Gene Panel + Genomate Report + Molecular Tumor Board)
8. Key stakeholder benefits in implementing Genous™ services
9. Prospects and objectives for deploying Genous™ in treatment facilities in Vietnam


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# The cancer landscape in Vietnam

## GLOBOCAN 2022 report

Cancer is the leading cause of death in Vietnam, with the most common types being breast, lung, liver, and stomach cancer.

International Agency for Research on Cancer
World Health Organization

GLOBAL CANCER OBSERVATORY

CANCER TODAY
GLOBOCAN 2022

**VIET NAM**

### CURRENT SITUATION IN VIETNAM

| New cases | Deaths | Number of cases 5 years |
|---|---|---|
| 180.840 | 120.184 | 409.144 |

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# Limitations and challenges in cancer diagnosis and treatment in Vietnam

Delayed diagnosis

Lack of manpower & modern equipment

Resistance to standard treatment therapies


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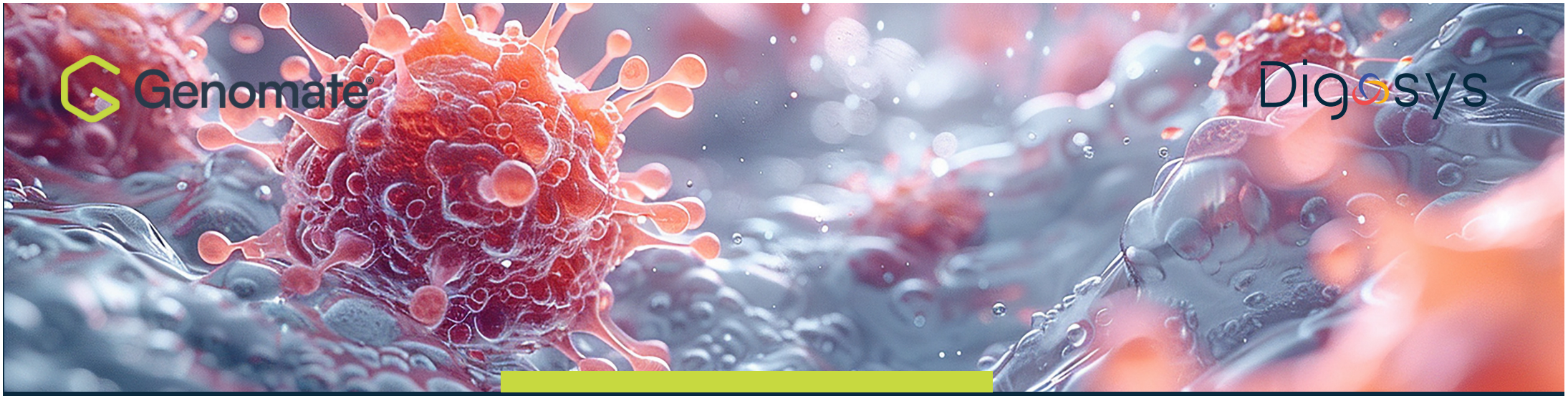
## Cancer and Personalized Therapy

- *Cancer is a genetic disease*
- *Each cancer patient has a unique set of genetic alterations*
- ***GPN structure** (Gene – Pathway – Network): from understanding to personalized therapies.*
- *Molecular tumor profiling guides precision oncology.*

**Precision Oncology?**




## Global trends and new treatment models

Molecular profiling tests

Developing precision therapies to optimize outcomes

Minimizing side effects for patients

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## Global trends and new treatment models (continued)

- Immunotherapy
- Targeted therapy
- Combination therapy
- Biotechnology and genetics
- Application of artificial intelligence

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## *The necessity of clinical decision support systems (CDSS)*

- *Enhancing accuracy in cancer diagnosis and treatment*
- *Accelerating the decision-making process*
- *Improving the quality of care*
- *Optimizing resource allocation*

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# Overview of the Genomate's solution

**Introduction**: Genomate is a Clinical Decision Support System (CDSS) developed to optimize cancer treatment by using artificial intelligence (AI) to accurately assign the appropriate targeted and immunotherapy drugs for each patient

**Objective**: To enhance the efficacy of treatment and personalize cancer therapy for each patient, aiming to increase survival rates, improve tumor response rates, extend progression-free survival (PFS), and improve the quality of life for patients


**Core Technology**: The system utilizes AI to analyze big data from genomics, molecular biology, and clinical information to recommend the most effective treatment strategies

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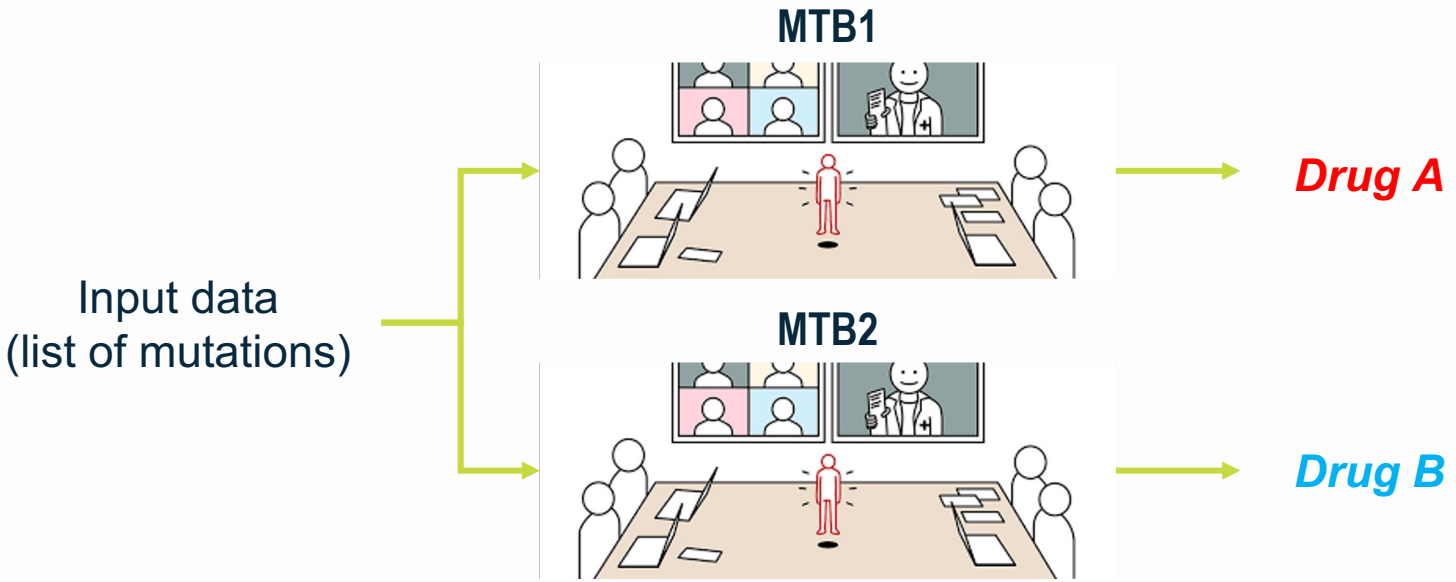
# How to standardise personalized therapy selection?




Molecular tumor boards (MTBs) generally have low concordance rates, 40% to 63%, from the same input data[1-3]

1 Rieke DT et al. JCO Precis Oncol. 2018;2:1-14. 2 Rieke DT et al. BMC Med. 2022;20:367. 3 Naito Y et al. JAMA Netw Open. 2022;5:e2245081.

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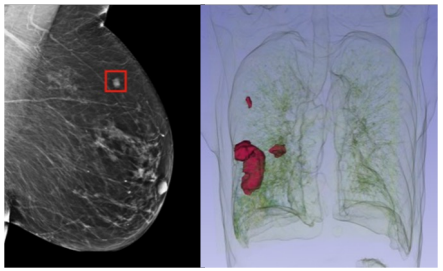
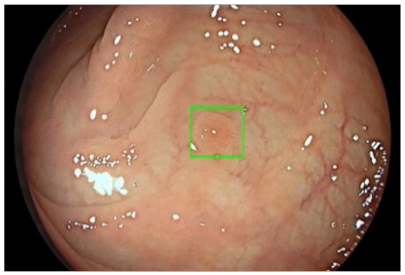
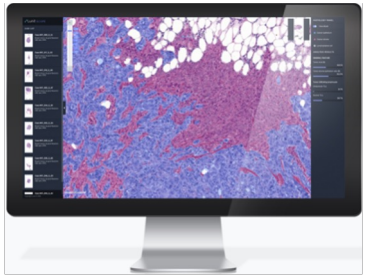
# The Role of AI in Healthcare



***AI in Radiology***
*(e.g., Uiyssys)*



***AI in Endoscopy***
*(e.g., Gi Genius)*



***Digital Pathology***
*(e.g., Lumit, 3HISTECH)*

***AI in drug discovery***
*(e.g., Turbine, Cytocast)*

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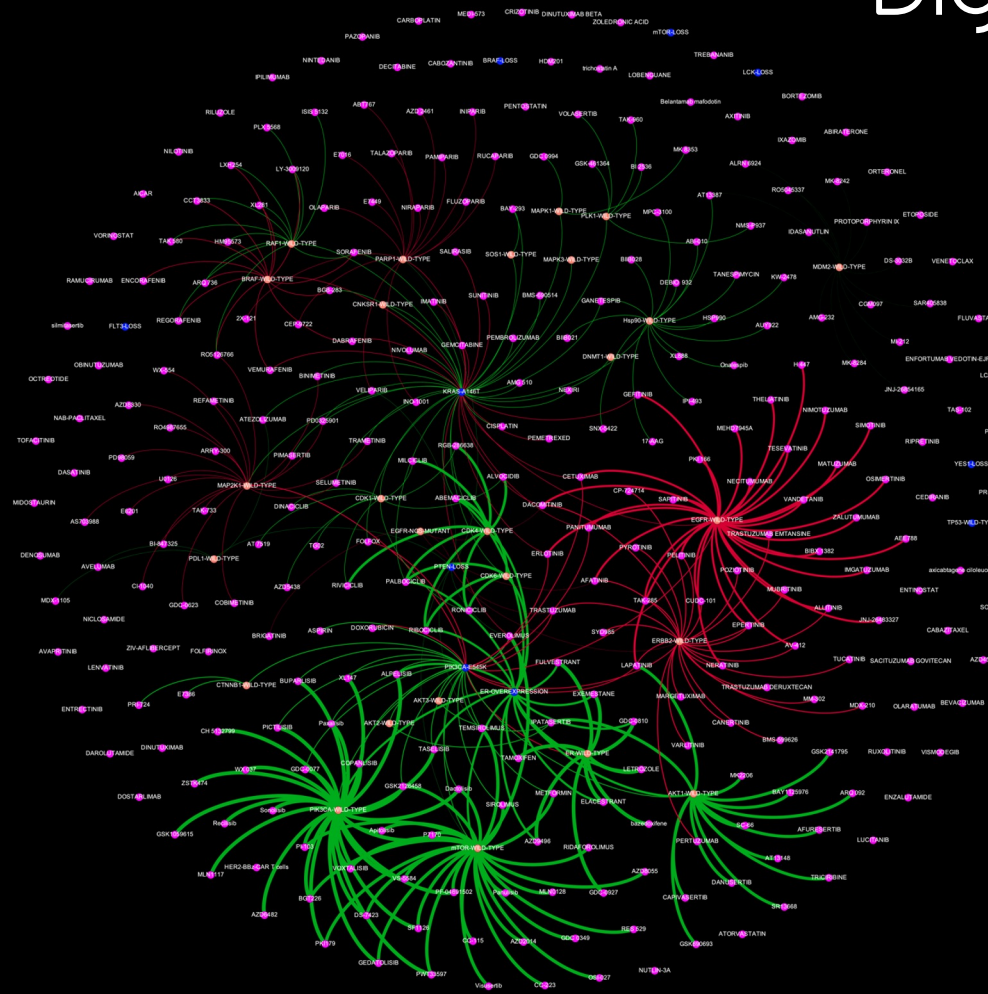
***Molecular Reasoning Network in a Typical Breast Cancer Patient (Extracted from SHIVA01 trial data)***



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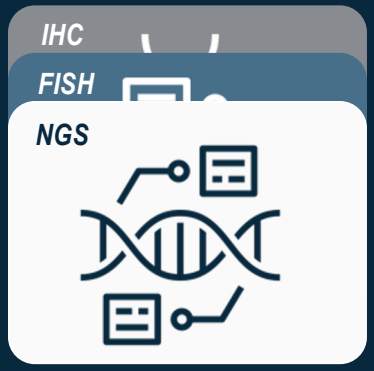
# *Digital Drug Assignment (DDA)*

The world's first AI-integrated clinical decision support system has demonstrated real-world efficacy





## *Input*

*All available molecular diagnostic test data of a cancer patient*

## *Genomate*

The system matches targeted therapies to the totality of available molecular information of the patient using its proprietary algorithm (DDA).

## *Output*

*Report with therapy recommendations*

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## Successfully treated for cancer

- Ms. Katalin (Hungary), diagnosed with lung cancer that had metastasized to the lymph nodes and brain in 2012
- Underwent personalized therapy guided by Genomate
- She is now cancer-free

*Katalin is co-author of a book in Hungarian titled "Akinek kétszer kelt fel a nap..." (tentative translation: "For Whom the Sun Rose Twice..."). The work includes several interviews, Katalin's diary entries, as well as contributions from her relatives, colleagues, treating doctors... regarding her journey of overcoming cancer with immense resilience, along with the support from medical advancements...*


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# Breakthrough Achievements of Genomate

| Around **10,000 cancer patients treated** | **Breakthrough Innovations (AI) in Oncology Award** | **AI-assisted CDSS in the field of oncology** | **Graduated the Mayo Clinic Accelerate program** |
|---|---|---|---|
| The number of patients who have received Genomate solutions in recent years | At American Society of Clinical Oncology in 2019 | The first and only system to demonstrate real-world clinical efficacy | Genomate represents a breakthrough in the healthcare field |

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# *Description of Genous™ services*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABL1 | BARD1 | CDH1 | DCC | ESR1 | FLT1 | HNF1A | KRAS | MSH3 | NTRK3 | PRKACA | RIT1 | SOS2 | TNFRSF14 |
| ABL2 | BCL2 | CDK12 | DDIT3 | ESR2 | FLT3 | HRAS | LIFR | MSH6 | NUP93 | PRKAR1A | RNF43 | SOX9 | TOP1 |
| ACVR1 | BCL2A1 | CDK4 | DDR2 | ETV6 | FLT4 | ID3 | LRP1B | MTOR | NUTM1 | PRKCA | ROBO1 | SOX10 | TNFRSS2 |
| ACVR1B | BCL2L1 | CDK6 | DDX3X | ETS1 | FOXA1 | IDH1 | LRRK2 | MUTYH | PAK3 | PRKDC | ROS1 | SOX2 | TP53 |
| AJUBA | BCL2L2 | CDK8 | DICER1 | EWSR1 | FOXL2 | IDH2 | LTB | MYB | PALB2 | PTCH1 | RPL10 | SP140 | TRAF3 |
| AKT1 | BCL2L12 | CDKN1A | DIS3 | EZH1 | FOXO1 | IGF1R | LZTR1 | MYBL1 | PARK2 | PTCH2 | RPTOR | SPEN | TRAF7 |
| AKT2 | BCL6 | CDKN1B | DNMT3A | EZH2 | FOXP1 | IGF2R | MALAT1 | MYC | PAX3 | PTEN | RRAS | SPOP | TSC1 |
| AKT3 | BCOR w/ 3'UTR | CDKN2A | DOT1L | FAM123B (WTX) | FRS2 | IKBKE | MAP2K1 | MYCL1 | PAX5 | PTPN1 | RRAS2 | SPRED1 | TSC2 |
| ALK | BCORL1 | CDKN2B | DUSP2 | FAM46C | FUBP1 | IKZF1 | MAP2K2 | MYCN | PAX8 | PTPN11 | RUNX1 | SPTA1 | TSHR |
| APC | BLM | CDKN2C | DUSP4 | FANCA | FUS | IL7R | MAP3K4 | MYD88 | PBRM1 | PTPRB | RUNX1T1 | SPRY1 | TSHZ2 |
| APOBEC3G | BMPR1A | CEBPA | DUSP6 | FANCC | GAB2 | INHBA | MAP3K1 | MYH9 | PDCD1LG2 | PTPRD | SDHB | SPRY2 | TSHZ3 |
| AR | BRAF | CHD2 | DYNC1I1 | FANCE | GATA1 | INPP4B | MAP3K2 | NAV3 | PDGFB | PTPRK | SDHD | SPRY4 | U2AF1 |
| ARAF | BRCA1 | CHD4 | EDNRB | FANCF | GATA2 | IRF4 | MAP3K5 | NBN | PDGFRA | PTPRT | SETBP1 | SRC | USP7 |
| ARFRP1 | BRCA2 | CHD5 | EIF1AX | FANCG | GATA3 | IRS2 | MAP3K7 | NCKAP5 | PDGFRB | RAC1 | SETD2 | SS18 | VHL |
| ARHGAP35 | BRD4 | CHEK1 | EGFR | FANCL | GLI1 | JAK1 | MAP3K9 | NCOA3 | PDK1 | RAD21 | SF3B1 | STAG2 | WISP3 |
| ARID1A | BRIP1 | CHEK2 | EGR1 | FAT1 | GLI2 | JAK2 | MAPK1 | NCOR1 | PHF6 | RAD50 | SH2B3 | STAT3 | WRN |
| ARID1B | BTG1 | CIC | ELF3 | FAT3 | GNA11 | JAK3 | MCL1 | NF1 | PIK3CA | RAD51 | SMH | STAT4 | WT1 |
| ARID2 | BTK | CLDN18 | EMSY (C11orf30) | FBXW7 | GNA13 | JAZF1 | MDM2 | NF2 | PIK3CG | RAD51C | SIN3A | STAT6 | XBP1 |
| ARID5B | CALR | CNOT3 | EP300 | FGF10 | GNAQ | KAT6A | MDM4 | NFE2L2 | PIK3R1 | RAD51D | SLIT2 | STK11 | XPO1 |
| ASXL1 | CARD11 | COL1A1 | EPCAM | FGF14 | GNAS | KDM5A | MED12 | NFKBIA | PIK3R2 | RAF1 | SUFU | SUFU | YAP1 |
| ASXL2 | CBFB | COL2A1 | EPHA3 | FGF19 | GPC3 | KDM5C | MEF2B | NFKBIE | PMS1 | RARA | SMAD2 | SYNE1 | YWHAE |
| ATF1 | CBL | CREBBP | EPHA5 | FGF23 | GPR124 | KDM6A | MEN1 | NIPBL | POLD1 | RASA1 | SMAD3 | TADA1 | ZMYM3 |
| ATM | CCND1 | CRKL | EPHA7 | FGF3 | GRIN2A | KDR | MET | NKX2-1 | POLE | RASA2 | SMAD4 | TBX3 | ZNF217 |
| ATR | CCND2 | CSF1R | EPHB1 | FGF4 | GRM3 | KEAP1 | MGA | NOTCH1 | POLQ | RB1 | SMARCA2 | TCF7L2 | ZNF703 |
| ATRX | CCND3 | CTCF | ERBB2 | FGF6 | GSK3B | KIT | MGMT | NOTCH3 | POT1 | RBM10 | SMARCA4 | TERT | ZNFN4A |
| AURKA | CCNE1 | CTNNA1 | ERBB3 | FGFR1 | H3F3A | KLF4 | MITF | NPM1 | POU3F2 | REL | SMARCB1 | TET2 | ZRSR2 |
| AURKB | CD79A | CTNNB1 | ERBB4 | FGFR2 | H3F3B | KLHL6 | MLH1 | NRAS | PPM1D | RELA | SMC1A | TFE3 | |
| AXIN1 | CD79B | CUL3 | ERCC2 | FGFR3 | HDAC4 | KMT2A | MLH3 | NSD1 | PPP2R1A | RET | SMC3 | TFEB | |
| AXIN2 | CD274 | CUX1 | ERG | FGFR4 | HGF | KMT2B | MPL | NTSC2 | PPP6C | RHEB | SMO | TGFBR2 | |
| AXL | CDC42 | CYLD | ERRFI1 | FH | HIF1A | KMT2D | MRE11A | NTRK1 | PRDM1 | RHOA | SOCS1 | TLR4 | |
| BAP1 | CDC73 | CXCR4 | ESPL1 | FLCN | HIST1H3B | KNSTRN | MSH2 | NTRK2 | PREX2 | RICTOR | SOS1 | TNFAIP3 | |

Large gene panel

Genomate report

Molecular tumor board

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# Key stakeholder benefits of implementing Genous™ services

Doctors and patients

Management system

Researchers and developers

Partners and insurance payers

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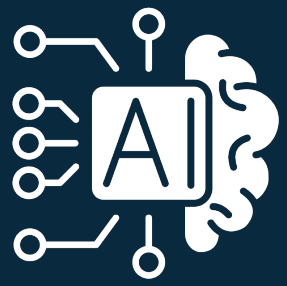
# Prospects and objectives of Genous™ in Vietnam




Integrating advanced technology

Enhancing the quality of patient care

Reducing pressure and improving cost-effectiveness for hospitals

Genomate: A breakthrough in the healthcare field

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# Discussion Questions

www.genomate.health | www.digosys.com