

## BlueMeme and Kyushu University Begin Joint Research on Developing Large Language Models Using Quantum AI

Applying Quantum AI which reduces operational costs of conventional AI technologies to biomedical language models

BlueMeme Inc. announced that BlueMeme and Professor Masao Nagasaki (Nagasaki Laboratory, Division of Biomedical Information Analysis, Medical Research Center for High Depth Omics, Medical Institute of Bioregulation, Kyushu University) have initiated a joint research project regarding the social implementation of “Biomedical Language Models using Quantum AI” in April 2023.

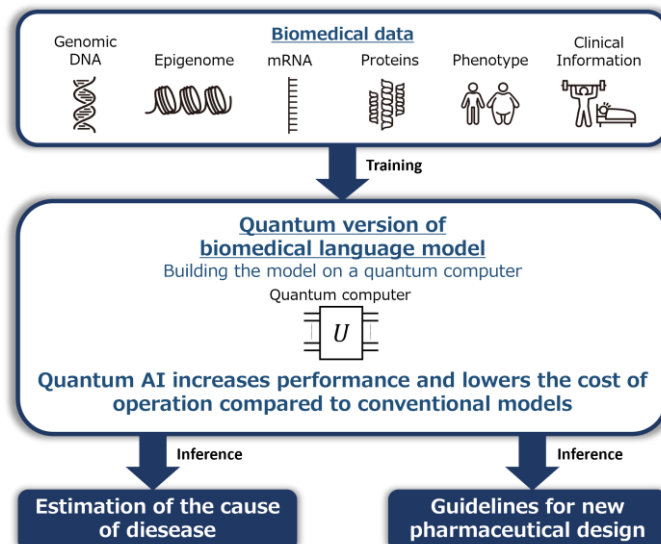


### Why is BlueMeme, as an IT company, working on biomedical information analysis?

Biomedical information analysis\* efficiently processes large amounts of biological data using AI and other computing technologies to provide valuable insights for medical research and clinical treatment. BlueMeme, on the other hand, has been driving enterprise Digital Transformation (DX) using the latest computing technology and sees biomedical information analysis as a target area where we can make a direct contribution.

### Joint research initiatives

1. Joint development of biomedical language models\*\* for medical research and clinical treatment.
2. Significant reduction in the number of parameters\*\*\* involved in training and inference of large language models through the use of Quantum AI\*\*\*\*.



### **Large Language Models and biomedical information analysis**

Recently, the development and widespread use of “Large Language Models” (LLMs), such as ChatGPT, has been rapidly progressing. LLMs enable natural interaction between AI and users and the execution of intellectual production tasks such as mathematical computation and coding by learning extensive amounts of natural language data. The biological data used in biomedical information analysis is very similar to natural language, thus we believe it is highly compatible with the LLMs which are designed to interpret natural language. Therefore, we believe that by training a LLM with a vast amount of biomedical data in the biomedical field, it can be used as a “biomedical language model” as one of the tools for disease cause detection and pharmaceutical design.

### **Significant cost reductions in operating biomedical language models through Quantum AI**

The development and operation of LLMs require extensive computational resources and high costs, preventing small and medium-sized companies, local governments, and research institutes from developing and operating LLMs. To solve this problem, BlueMeme focuses on Quantum AI, which is expected to grow in the future.

Quantum AI is an artificial intelligence technology that uses quantum computers and is expected to reduce the cost of operating LLMs significantly. In particular, Quantum AI allows the training and inference of LLMs, which have been performed on classical computers, to be carried out on quantum computers. This technology would drastically reduce the number of parameters in the model and is expected to reduce the costs associated with operating the model in the future. Lowering the cost of developing biomedical language models will pave the way for the operational and clinical application in a broader range of research institutions and companies. Accordingly, BlueMeme is collaborating with Professor Masao Nagasaki of Kyushu University to develop language models in the biomedical field using Quantum AI and to promote performance verification for social implementation.

### **Role of both parties**

- **BlueMeme**
  - Proposal and construction of algorithms for biomedical language models with Quantum AI.
  - Training the model on quantum computing platforms, including GPU simulators.

“The development of high-performance generative AI, as typified by ChatGPT, requires computing technology that can process enormous amounts of computation in a short period, and the use of quantum computing technology, which significantly increases computation speed, is indispensable. We believe that this joint research with Kyushu University in the biomedical field is a crucial step toward establishing Quantum AI, which combines quantum computer technology and AI, and achieving its implementation in society. We expect that the results of Quantum AI in this research will further promote the use of quantum computing technology in developing LLMs in life sciences and a wide range of other fields.”

Masanori Matsuoka, CEO of BlueMeme

- **Kyushu University**

- Practical applications of omics analysis methods, including genomic information analysis, based on expertise in medical informatics.
- Propose algorithms applicable to quantum computing platforms and develop test and evaluation plans.

“We believe that LLMs must utilize accurate information from each knowledge domain. There are many different layers of biomedical information. Therefore, the appropriate selection of primary information is necessary for developing biomedical language models, and experts in the biomedical domain are indispensable for such selections. The use of quantum technology for future LLMs is also expected, and we have very high expectations for Quantum AI.”

Masao Nagasaki, professor of the Division of Biomedical Information Analysis, Medical Research Center for High Depth Omics, Medical Institute of Bioregulation, Kyushu University

**Details of the research (in Japanese) :**

<https://www.bluememe.jp/research-and-development/>

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\* Biomedical information analysis: Analysis of biological data, such as genomic data, and clinical information, such as patient medical records, using computational methods such as machine learning and statistics.

\*\* Biomedical language models: Artificial intelligence models to be developed by learning vast amounts of biological data such as DNA and clinical information to specialize in biomedical information analysis.

\*\*\* Number of parameters: Adjustable variables used to train an artificial intelligence model from data. The number of parameters determines the performance of the model.

\*\*\*\* Quantum AI: Research field that combines artificial intelligence and quantum computing. Research is being conducted to apply the characteristics of quantum computer computation to machine learning and deep learning.

**About BlueMeme Inc**

BlueMeme was the first company to introduce OutSystems, a low-code development platform, to Japan in 2012. Since then, the company has been at the forefront of the Japanese low-code development market. BlueMeme utilizes its own development methodology, “AGILE-DX”, to effectively operate agile methods and low-code technologies. By developing next-generation information systems with the latest technologies, BlueMeme will continue contributing to Japanese companies, helping them improve their global competitiveness and survive disruptive changes through digital transformation (DX). As of 2021, BlueMeme is listed on the Tokyo Stock Exchange (“4069” corporate code).

URL : <https://www.bluememe.jp/>

**Kyushu University**

Division of Biomedical Information Analysis, Medical Research Center for High Depth Omics, Medical Institute of Bioregulation, Masao Nagasaki

The impact of this matter on business results will be minor.

**Press Contact**

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