



Seizing Opportunities in the Air

Case in Point: U.S.-Japan Cancer Research

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In recent years, medical research institutions have been expanding international collaboration to develop an effective drug for cancer. Cooperative projects help researchers to pool their limited resources and share their knowledge in this tremendously complex field. This article explores the collaboration between Japan's National Cancer Center (NCC¹) and the Frederick National Laboratory for Cancer Research (FNL²).

Centered around AI tools, which are must-have technologies for faster discovery and analysis of compounds for cancer treatment, this U.S.-Japan joint project came about serendipitously following a chance meeting between the project coordinators. Dr. Akihiro Ohashi of NCC and Ms. Naomi Ohashi of FNL shared with Washington CORE how this collaboration happened and insights on its success.

Chance Meeting between NCC and FNL

The spark for collaboration between NCC and FNL was a chance meeting between Dr. Akihiro Ohashi, Head of the Division of Translational Genomics at NCC's Exploratory Oncology Research & Clinical Trial Center (EPOC), and FNL staff members Dr. Eric Stahlberg, Director of the Cancer Data Science Initiative,³ and Ms. Naomi Ohashi, Technical Project Manager of the Accelerating Therapeutics for Opportunities in Medicine program (ATOM). They met in 2020 during a tour of NCC's facility near Tokyo organized by the Japan External Trade Organization (JETRO), and quickly saw the potential value in joining forces on cancer research.⁴

NCC, Japan's premier cancer research institute, was launched in 2012 to lead the discovery and development of innovative drugs and medical devices. In particular, NCC's EPOC has been working to establish a structure for conducting first-in-human drug trials, investigator-initiated trials, and translational research. To further these goals, EPOC has expanded its collaborative research with a range of external partners,⁵ such as the University of Tokyo Graduate School of Frontier Sciences,⁶ Harvard University Beth Israel Deaconess Medical Center,⁷ and Spanish biotech startup Arjuna.⁸

FNL⁹ which is operated by Leidos Biomedical Research, Inc.¹⁰ for the U.S. National Cancer Institute (NCI¹¹) is the only national laboratory in the U.S. exclusively dedicated to biomedical research, and focuses in particular on treatments for cancer, AIDS, and infectious diseases. FNL co-leads the Accelerating Therapeutics for Opportunities in Medicine (ATOM) consortium, a public-private partnership organization launched in 2017 to leverage emerging AI capabilities for drug discovery.¹² ATOM is focused on developing an open, AI-aided, drug discovery platform to shorten the typically multi-year process required to develop new and more effective cancer treatments. In addition to FNL, the partner organizations include Lawrence Livermore National Laboratory, the University of California, San Francisco (UCSF), Brookhaven National Laboratory and Oak Ridge National Laboratory.¹³

Thus, NCC and to FNL have complementary strengths for cancer research: NCC in drug compound evaluation, and FNL in AI-aided drug discovery. These capabilities echo the respective core strengths of Japan and the U.S. for medical research: Japan excels at high quality and precise processes for drug evaluations (sometimes called "wet" lab research), while the U.S. has tremendous capacity for developing cutting edge in-silico technologies ("dry" research).

Dr. Ohashi, Dr. Stahlberg, and Ms. Ohashi presented a collaborative research proposal to senior officials at NCC and FNL, who were quick to support the idea and sign an MOU. This approach to collaboration could be called "bottom up" or "organic", because the researchers from both sides had already developed a research project proposal before signing an MOU, contrary to the typical process.

U.S.-Japan Collaboration on AI-assisted Drug Discovery

Dr. Ohashi was particularly interested in working with FNL for the opportunity to advance NCC's CENP-E (CENTromere-associated Protein-E) project.¹⁴ This project is developing novel CENP-E inhibitors that help the immune system to fight off cancers by attacking "cancer vulnerabilities". By enlisting the help of the ATOM platform for faster drug discovery, Dr. Ohashi hopes to identify a drug that would be more widely effective for patients. Once a promising drug candidate is identified, NCC can conduct clinical trials to assess its effectiveness.

NCC-FNL's CENP-E collaborative research received very positive feedback when it was presented at the April 2023 American Association for Cancer Research conference¹⁵ in the U.S. This type of promotion is critical for raising international awareness of the many examples of groundbreaking research being done in Japan, which are often not widely known among researchers at counterpart organizations in other countries. In doing so, NCC and the wider Japanese cancer research community can demonstrate Japan's strong potential as a research partner.

NCC and FNL are optimistic that later this year a compound can be identified based upon the data collected through research leveraging AI-based predictive capabilities, which would be a major milestone for drug discovery. They are not certain that the new discovery will lead to a new drug at this moment, but they are hopeful for great results. They also hope that their example of cooperation will inspire researchers around the world to combine their strengths to more effectively battle cancer and other diseases.

Challenges for International Collaboration

Data management is highly complex for international collaborations like that between NCC and FNL, especially when data is provided by private sector entities. It is a difficult challenge to protect intellectual property, while at the same time preserving the research benefits of openness and data sharing. Ultimately, as NCC and FNL are both public institutions, they want to ensure that their research provides benefits to the public. NIH has developed a data-sharing policy to try to address these various concerns.

Success Factors for International Research Collaboration

According to the partners, one of the key success factors for international collaboration is to cultivate a spirit of open-mindedness at research institutions. FNL has collaborative relationships with more than 100 organizations around the world, but hadn't yet had the opportunity to find a partner in Japan. Unusual for a Japanese life sciences institution, NCC's quick embrace of collaboration is typical of the open-minded approach to research spearheaded by EPOC Director Dr. Toshihiko Doi. Under his leadership, NCC has striven to leverage cutting edge research technologies, regardless of where they may be developed. In addition to the collaboration with FNL, NCC is also collaborating on cancer treatment research with Spanish biotech startup Arjuna - which has a unique research platform to generate small molecule inhibitors - as well as with Singapore-based advanced materials producer Enlipsisium,¹⁶ which has developed a technology that enables higher image resolutions to improve the safety and effectiveness of existing radiation therapy treatments.

Another driver for international collaboration on drug development is the geographic variation in disease concentrations. For example, gastric cancer is very prevalent in Japan and across Asia, but relatively rare in North America, and as a result, there has not been much research on gastric cancer in North America. NCC is therefore in a good position to work with pharmaceutical companies in North America to conduct clinical trials in Japan for this disease.

Seizing Opportunities in the Air

Successful research requires passion, courage, and the spirit to challenge the unknown. This requires researchers to aggressively seek out new opportunities, and to seize them when they arise. While researchers can enhance their capabilities and build their skills by studying and/or working overseas and regularly participating in international conferences and events, it is also important to send signals to fellow researchers that they can be great partners to form a win-win relationship. It is equally important to provide researchers with institutional support to enable international partnerships. International collaboration is complex, and it is essential to have capable project managers who can work around obstacles to turn research ideas into actual projects. Much like NCC and FNL have successfully partnered on cancer drug discovery, the key takeaway is to be ready to seize opportunities "in the air", whenever and wherever they present themselves!"

Interviewee Bios



Dr. Akihiro Ohashi, Head of the Division of Translational Genomics, Exploratory Oncology Research & Clinical Trial Center, National Cancer Center

As Head of the Division of Translational Genomics at the National Cancer Center, Dr. Ohashi works on deeply understanding “cancer hallmarks and vulnerability” to develop novel cancer therapeutic drugs.¹⁷ He previously worked for Radiation Oncology and Laboratory Medicine and Pathology at Mayo Clinic as well as the Oncology Drug Discovery Unit at Takeda Pharmaceutical Company Ltd. and has deep experience with all aspects of the drug discovery process.¹⁸



Naomi Ohashi, ATOM Technical Project Manager, Cancer Data Science Initiative, Cancer Research Technology Program, Frederick National Laboratory, National Cancer Institute

Ms. Ohashi supports projects and operational teams for the ATOM (Accelerating Therapeutics for Opportunities in Medicine) Consortium, a public-private partnership committed to transforming drug discovery by applying AI-based computational approaches. She manages multiple AI drug discovery projects using the ATOM PipeLine (AMPL) and generative molecular design to predict and optimize novel compounds. She previously worked at Otsuka America Pharmaceutical and the Japan External Trade Organization.¹⁹

Endnote

¹ <https://www.ncc.go.jp/en/>

² <https://frederick.cancer.gov/>

³ <https://frederick.cancer.gov/research/cancer-data-science-initiatives>

⁴ https://www.jetro.go.jp/en/invest/investment_environment/success_stories/ncc_fathomx_arjuna_enlipsium_fnlcr.html

⁵ <https://www.ncc.go.jp/en/epoc/about/greeting/index.html>

⁶ <https://www.k.u-tokyo.ac.jp/en/index.html>

⁷ <https://eye.hms.harvard.edu/bidmc>

⁸ <https://arjunatherapeutics.com/>

⁹ <https://frederick.cancer.gov/>

¹⁰ <https://www.leidos.com/company/subsidiaries/leidos-biomedical-research>

¹¹ <https://www.cancer.gov/>

¹² <https://atomsience.org/>

¹³ <https://datascience.cancer.gov/collaborations/nci-department-energy-collaborations/atom>

¹⁴ https://www.ncc.go.jp/jp/cpot/seeds_catalog/CPOT_ENGAll.pdf Slide 4

¹⁵ <https://www.aacr.org/meeting/aacr-annual-meeting-2023/>

¹⁶ <https://www.enlipsium.com/>

¹⁷ https://www.ncc.go.jp/en/epoc/division/translational_genomics/kashiwa/members/20190716092333.html

¹⁸ https://www.ib.k.u-tokyo.ac.jp/english/faculty/cancer_biology/ohashi_akihiro/

¹⁹ <https://www.linkedin.com/in/naomio/>

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