

Medical care for a mega-city

In the mega-metropolis of Tokyo, home to upwards of 37.8 million people, **MULTIDISCIPLINARY APPROACHES TO MEDICAL CARE** are helping to address a wide range of contemporary health issues linked to ageing, genetic traits and lifestyle factors.

Big challenges call for big visions. A focus on multidisciplinary teamwork is enabling the Tokyo Metropolitan Institute of Medical Science (TMiMS) to tackle health issues prevalent in big cities and to advance medical research and education.

TMiMS was founded in April 2011 by the merger of three institutes under the Tokyo metropolitan government, namely the Tokyo Metropolitan Institute of Medical Science, the Tokyo Metropolitan Institute for Neuroscience and the Tokyo Metropolitan Institute of Psychiatry. The 'reborn' TMiMS aims to promote synergy between each of the former institutes' distinctive specialities, and brings together outstanding researchers with diverse expertise across the medical and life sciences.

"WE HOPE TO BE A ROLE MODEL FOR MEDICAL RESEARCH INSTITUTIONS IN THE COMING DECADES."

"Our institute is at the forefront of a new trend of medical research in which new drugs and therapies are

developed by placing greater emphasis on strong basic science," says Hisao Masai, director general of TMiMS.

"We also focus on social medical science and nursing, which are integrated with basic science to improve quality of life for patients — for example, to predict and prevent mental disorders common to urban lifestyles," he says. "This unique combination of basic science, clinical medicine and social medicine is our key strength."

Leading the way to better health

Research at TMiMS is broad, reflecting the diversity of topics needed for today's medicine, and ranges from genome and protein functions, stem cell development and neurobiology to viral infections, allergies, behavioural disorders and patient welfare. The institute now comprises six departments: genome medicine; dementia and higher brain function; brain development and neural regeneration; psychiatry and behavioural sciences; advanced science for biomolecules, and sensory and motor systems.

Longevity-associated research is a key area of focus, in light of Japan's rapidly ageing society. "Tokyo is a microcosm



Tokyo Metropolitan Government building (top). Keiji Tanaka, chairperson of TMiMS (bottom left). Hisao Masai, director general of TMiMS (bottom right).



of the entire nation," says Keiji Tanaka, the former director general and current chairperson of TMiMS. "We have witnessed a steady increase in the incidence of various illnesses — not only cancer and infectious diseases, but also other adult conditions — that accompany ageing, including brain and mental disorders," says Tanaka. "Tokyo must strive to take a leading role internationally in combating these health issues."

TMiMS is officially backed by the Tokyo metropolitan government, which provides continuous funding for core staff scientists and research

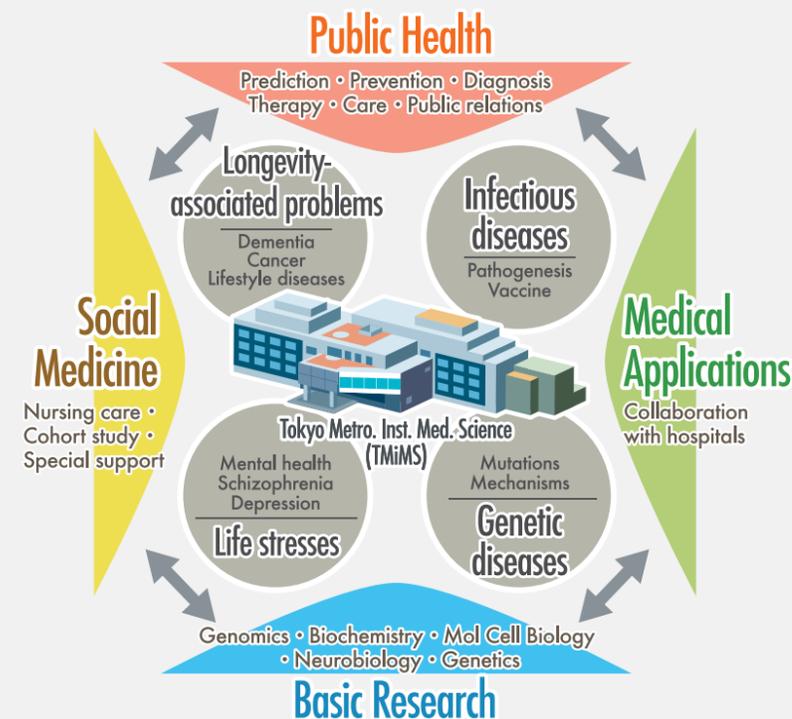
expenses, and such "guaranteed continual support permits us to plan long-term and challenging projects," Masai comments.

Being in close contact with the medical bureau of the Tokyo metropolitan government also means that TMiMS has access to a constant flow of information about health-related issues affecting the city in real time.

This channel of communication is vital for the capital to respond to emergencies quickly and effectively. For example, in response to an outbreak of dengue fever in Tokyo in 2014, TMiMS was able to immediately initiate a vaccine development

SHAPING A BROADER VISION

TOKYO METROPOLITAN INSTITUTE OF MEDICAL SCIENCE is embracing multidisciplinary approaches to improve health and medical care.



SIX RESEARCH AREAS OF TMiMS

- 1. Genome medicine**
(cancer, genome inheritance, animal disease models, viral infections, allergy)
- 2. Dementia and higher brain function**
(neurodegenerative diseases, memory, neural pathway repair)
- 3. Brain development and neural regeneration**
(brain development and diseases, epilepsy and autism, neuronal networks)
- 4. Psychiatry and behavioural sciences**
(mental health, schizophrenia, affective disorders, sleep, addiction and pain treatment)
- 5. Advanced science for biomolecules**
(proteasome, ubiquitin and Parkinson's diseases, calpain, stem cells, gene editing, stroke-induced inflammation)
- 6. Sensory and motor systems**
(retinal neurodegenerative diseases, motor control in the brain, diabetic neuropathy, nursing)

plan to design an effective vaccine.

The institute's location also boosts its connectivity: being right in the heart of Tokyo facilitates visits to TMiMS from scientists from around the world, enabling a network of strategic relationships. Situated in a quiet, leafy area of Setagaya, TMiMS is just 20 minutes by car from downtown Shinjuku, and can be reached in around 40 minutes from Haneda Airport.

A targeted approach

Going forward, Tanaka says that TMiMS aims to draw on

its multidisciplinary structure to develop novel diagnostics, drugs and therapies targeting diseases including those associated with longevity, those caused by complicated genetic traits, and also mental disturbances caused by stress associated with urban living.

To achieve these goals, the institute is striving to uncover the molecular basis of biological systems. Namely, TMiMS researchers are working on understanding molecular mechanisms of fundamental processes at the genomic, molecular, cellular and

whole-body levels. They are also studying the molecular basis of diseases and developing more targeted methods to identify and treat them.

"We are also exploring new directions offered by the emerging field of molecular social medicine," Masai says. "Together with top-level nursing systems, we aim to improve welfare and quality of life for patients as well as care for the elderly."

In a city as vast and busy as Tokyo, the health challenges are broad and not always predictable. Even so, by

monitoring health-related trends and responding to pressing issues, Masai says that TMiMS can play a significant role in helping to inform other cities addressing similar issues in future: "We hope to be a role model for medical research institutions in the coming decades." ■

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