FOCAL POINT ON KOBE

PRODUCED IN PARTNERSHIP WITH THE FOUNDATION FOR BIOMEDICAL RESEARCH AND INNOVATION

CO-LOCATED FOR COLLABORATION

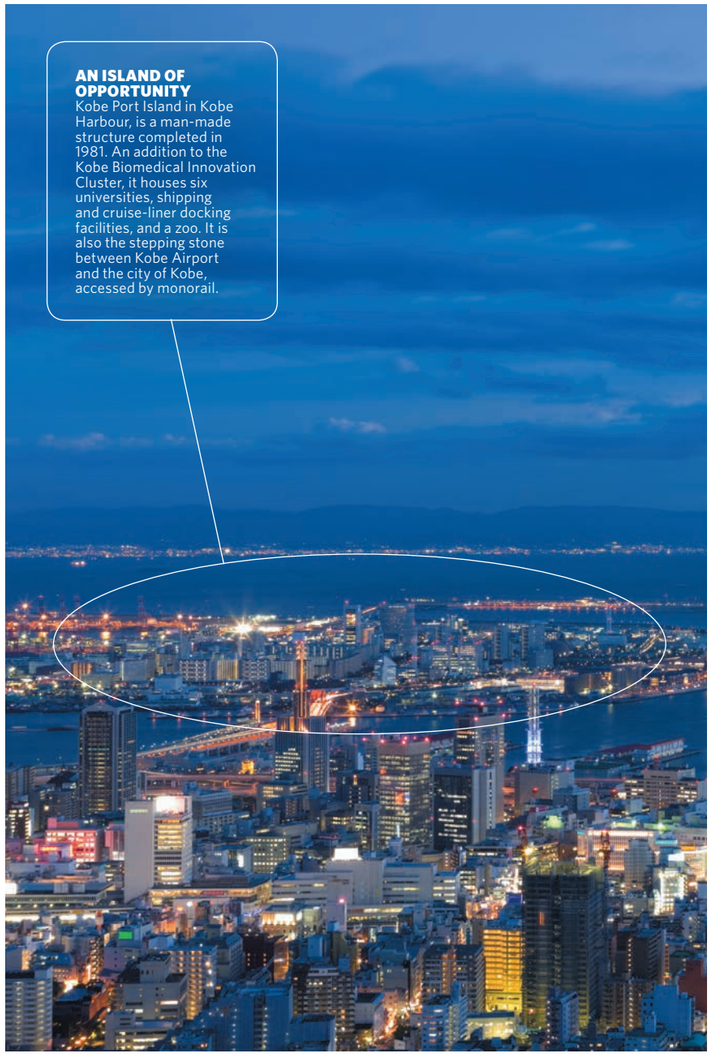
The results from KOBE'S BIOMEDICAL HUB show there is strength in sharing research infrastructure.

A condition known as vocal fold scarring stiffens the vocal cords and makes it difficult for people to speak or sing. It generally happens to people who use their voice a lot, such as singers, but who and why it will strike is difficult to predict. A research institute in Kobe, Japan, helped advance a first-of-its-kind clinical trial that showed how injections of growth factor can regenerate the mucosa lining of the vocal cords. The findings could help patients regain their voices.

The institute behind the study, the Translational Research Center for Medical Innovation (TRI), is one of about 350 research centres, specialized hospitals, companies and universities grouped in a unique science campus on Port Island off Kobe. Founded after the 1995 earthquake that devastated the region, the Kobe Biomedical Innovation Cluster (KBIC) is now producing some of the most cutting-edge medical research in the world.

Offshore innovation

KBIC's mission was not only to create jobs and revitalize the local economy, but to promote the health and welfare of local people and to improve medical standards across Asia. It contains facilities across the entire range of medical research and development, from basic research to clinical applications and mass production. The core resources are used by groups in and outside Kobe, including TRI, the International Medical Device Alliance, the Kobe Hybrid Business Center, and the Kobe Medical Device Development Center.



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THE 1995 GREAT HANSHIN EARTHQUAKE
measured 6.9 on the moment magnitude scale and lasted 20 seconds.

THE KOBE BIOMEDICAL INNOVATION CLUSTER
contributed an estimated 153.2 billion yen (US$1.37 billion) to the Japanese economy in 2015.

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The central pillar of the cluster is the Foundation for Biomedical Research and Innovation at Kobe (FBRI). Founded in March 2000, its mission is to promote advanced clinical research, next-generation healthcare systems and collaborations among KBIC entities.

"The FBRI has been endeavouring to build an ecosystem of healthcare innovation, through engaging in R&D, supporting clinical research, providing business support and strengthening the research and business networks within the KBIC," says FBRI President Tasuku Honjo, a Kyoto University immunologist who is renowned for identifying a protein known as Programmed Cell Death Protein 1.

New medical frontiers

The FBRI is supporting a promising field of inquiry that has made headlines around the world in recent years. In 2006, Kyoto University researcher Shinya Yamanaka showed how adult cells could be converted to stem cells with the ability to differentiate into any kind of cell. These induced pluripotent stem (iPS) cells allowed researchers to avoid the ethical problems associated with using embryonic stem cells and opened up the new field of regenerative medicine. Over the past few years, researchers at the RIKEN Center for Developmental Biology (CDB) in Kobe and Kobe City Medical Center General Hospital have brought the technology to clinical application. They have been transplanting retinal cells derived from iPS cells into patients with age-related macular degeneration, a leading cause of vision loss in people over 50.

"We are now completing follow-up checks of the patients and we look forward to a new trial involving photoreceptor cells to treat retinitis pigmentosa," says Masayo Takahashi, a project leader at RIKEN CDB. "I'm sure regenerative medicine will be a very standard form of treatment in the future."

Takahashi says her work has benefited from the FBRI because it has facilitated many industry collaborations related to gene therapy. One example is her appointment as special advisor to Healios KK, a biotech startup based in Kobe and Tokyo that is working on iPS cell clinical applications in conjunction with Sumitomo Dainippon Pharma and RIKEN.

Building next-generation tools

RIKEN hosts one of the world's most advanced computer research facilities, located on Port Island. The RIKEN Center for Computational Science (CCS) is home to the K computer, a supercomputer built by Fujitsu that was ranked fastest in the world by the TOP500 computing project in 2011; it was also the world's first supercomputer to achieve 10.51 quadrillion floating point operations per second.

Since then, the K computer has been used for everything from industrial design simulations to global climate modelling and analysis of genetic and drug data. Scientists at RIKEN and its partners are now building a post-K computer, which will be available for public use around 2021.

"The development is going extremely well, and we believe the Post-K inherits all the good traits of K and fixes its shortcomings, making it a landmark, game changing machine of the time," says Satoshi Matsuoka, a professor of computer science at Tokyo Institute of Technology and director of RIKEN CCS. "We already have the first chip and it is performing as expected, in some cases better. The chip will outclass every existing CPU by several factors in all metrics."

The KBIC and FBRI will continue to build on their legacy of making Kobe a leading biomedical cluster as they tackle the social problems of the twenty-first century.

"The FBRI will continue to carry out fundamental research mainly in fields where new medical treatments or medications are urgently required, such as cancer immunology, ageing and dementia," says Honjo. "We're focused on proposing solutions to problems along the way to realizing a society where people can enjoy good health and longevity." ■

MACULAR DEGENERATION
is a form of blindness caused by dysfunction in the retinal pigment epithelium

" I'm sure regenerative medicine will be a very standard form of treatment in the future."