

International expansion through *In-vivo* imaging research with transgenic rats

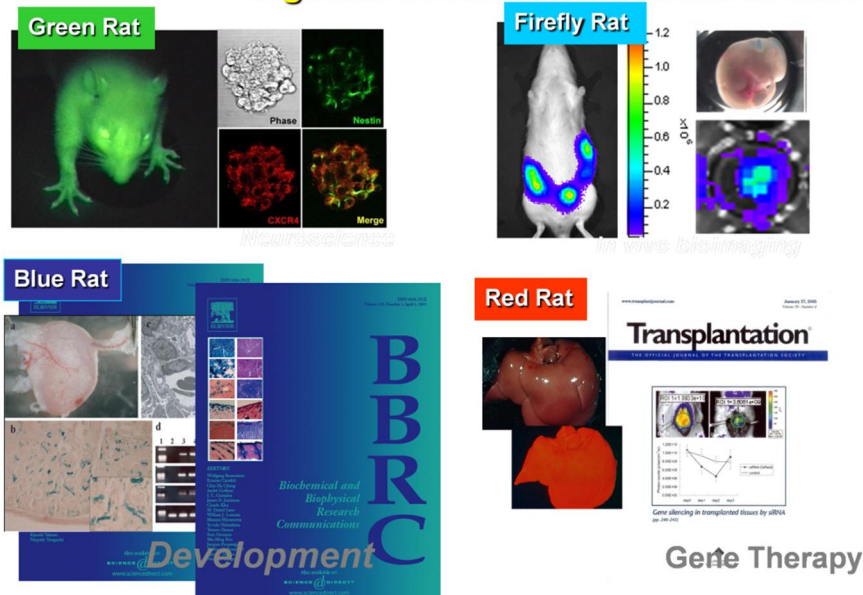
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Recent years the importance of translational research has been highlighted due to the fact that the research field is based on most updated pragmatic knowledge of biotechnology for clinical applications. Especially in the field of medicine where living human being is the main focus, the effectiveness and safety for the findings in basic researches should be scientifically proven *in vivo* in order to apply them for medical treatment. Even in most recent years experimental animal models backed up by animal welfare are indispensable in the field of transplant and regenerative medicine which is expected as astonishingly advanced medical treatments. The research method utilizing light as *in-vivo* imaging has benefits not only for scientifically observing the symptom occurring *in vivo* directly from our eyes but for giving us a chance to observe noninvasively experimental animals without sacrifice death from ethical point of view. I would like to propose that we should share these state-of-the-art tools internationally if we take contributions to further more patients into consideration.

I have been researching for organ transplantation; especially regenerative medicine which has been generating public attention these years. From clinical standpoint of organ transplantation, in 2008 I was a member to have outlined the Istanbul Declaration mainly focusing on "Self-sufficiency in transplantable organs and protection towards living donors" and contributed to the expansion globally in the consequence. The fundamental problems of worldwide shortage in quantities for transplantable organs have led me to pursue for "Development of researches for organ fabrication by myself".

My research method has been based on the optimization of microsurgery technology for small animal organ transplantation models such as rats. For the purpose of translational researches in the field of transplant and regenerative medicines, I have been working on rats physically larger than mice to generate genetically-modified rats.

A Powerful Tool for Translational Research - Engineered Rats established in JMU-



Among the rats developed, it is a honor that our GFP Tg rat is categorized as the strongest fluorescent one in the world. Right after the generation, I have done co-research with Dr. A. Keating (Canada) and Dr. P. Leon (USA) and have provided the rats to many researchers by way of the public bank located at the University of Missouri. In Europe the co-researches have been widely done at laboratories in Germany where colonies have been kept at Dr. K Nikkahanø (Freiburg) and at Dr. R Talbaø (before in Bonn and now in Ashen). In Japan, this brightest GFP rat has been also reported by Dr. Y Sawa `s (Osaka) group.

Furthermore, the Luciferase Tg rat has been paid more attention from all over the world that it has been acting as an *in vivo* imaging tool without sacrificing the tissue or organ transplanted recipient animals. While developing co-researches with top-notch researchers in Japan and overseas, I have been sharing the rats under the name of Firefly Rat with researchers belonging to surgical societies such as The Japan Society for Organ Preservation and Biology and have been deposited at domestic official banks such as RRRC (at Kyoto University). The technology has been greatly influencing the development of imaging devices, in the meantime, the acceleration of related research is urgently needed in shape of academia-industry cooperation.



Research Development by Luc Tg Rat

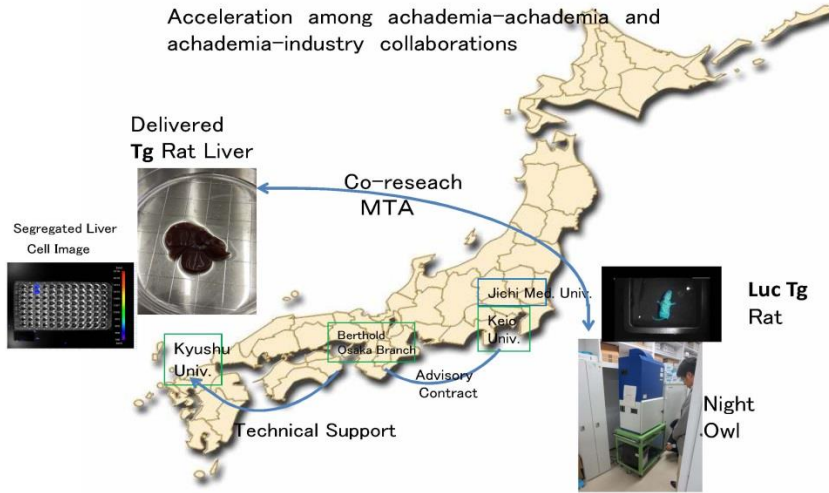
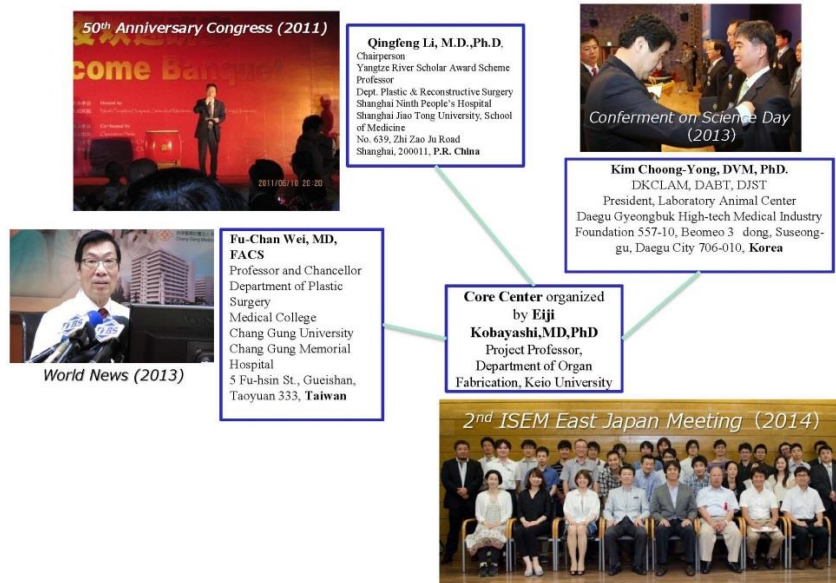


Figure: Example of academia-industry cooperation through Imaging Rats

The Luc Tg Rat liver segregated at Jichi Medical University was transferred to Kyushu University. Based on the research material provided, at Kyushu University we push forward the research initiative in collaboration with imaging device company.

Further progresses have been made through the expansions of Luc Tg rats colonies to Dr. QF Lee in China, Dr. FC Wei in Taiwan and Dr. CY Kim in Korea as academic research tools and they are composing an academia network in Asia.

Asian *In Vivo* Imaging Network for Translational Research



In order to optimize the efficiency of genetically-modified Luc Tg rat, experimental microsurgery technique is indispensable in order to generate the experimental animal model properly. For these 20 years, the expansion of experimental microsurgery has been depended upon ISEM (International Society for Experimental Microsurgery) with Dr. Sun Lee as a founder. And in June, 2015 the joint symposium is scheduled at The 50th International Congress of European Society for Surgical Research; ESSR for the development of researches focusing on the welfare of experimental animals.

The sharing of genetically-modified rats is not good enough to give a fruit to scientific research results. I have a dream to give a cutting-edge treatment to patients suffering from pain globally as soon as available through newly developed technology of mine on fluorescent and luminescent substances by sharing it with researchers in Japan and overseas.